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OL. LII No. 12

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VETERINARY Medicine

Established 1905

features in this issue...

Treatment of Organic Phosphate Insecticide Poisoning
Leptospira Agglutinins in Blood of Horses
Bovine Interdigital Overgrowth
Clinical Experiments in Natural Outbreaks of Porcine Leptospirosis
Breeding-Rest Fertility Program
Pharmacy Management: Buying and Inventory Control
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Studies on the Mechanism of Iodide Activity
Novobiocin Therapy in Feline Pneumonitis
N-Butyl Chloride as a Whipworm Anthelmintic
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*U.S. Patent No. 2,772,167
[1]J. of Nutrition, 53:1, May, 1954.
[2]Armour Research Foundation Report Project No. C616.
[3]Jensen-Salsbery Research Data: In press.

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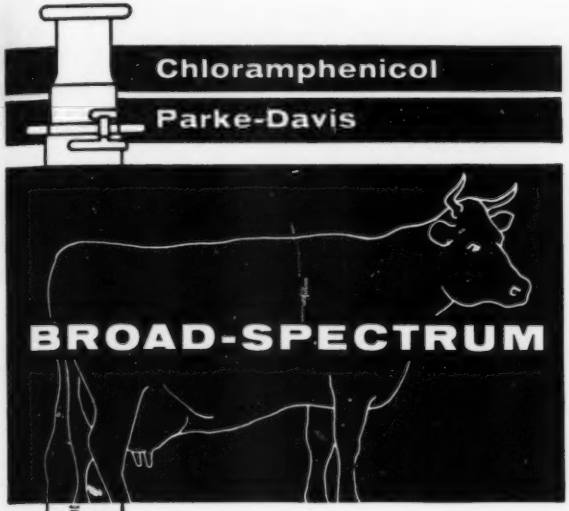

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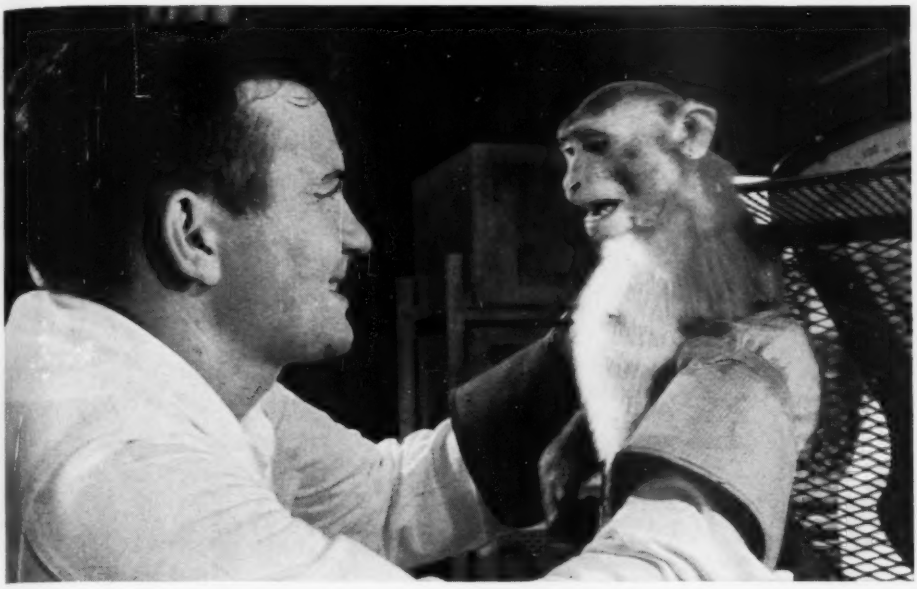

Man see what monkey do!

(and vice versa)

The rhesus monkey is a vital link in the production of the Salk polio vaccine. The instantaneous overwhelming demand for the vaccine, after its announced perfection, suddenly made these monkeys extremely precious.

Thousands upon thousands of the temperamental little primates were imported. One of the major problems in handling them was nutrition and sanitation. By good fortune, Purina researchers, who had just successfully perfected a new process, saw in this unique feed form a possible quick solution to the monkey nutrition problem . . . a problem already critical.

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PURINA...YOUR PARTNER IN SERVING ANIMAL AGRICULTURE

in canine distemper

the way it was

"While discussing canine distemper permit me to say that nothing new is being done in the way of treatment. We still believe that good nursing, warm, dry housing, and symptomatic treatment constitute rational therapy. For those mixed infected cases where the patient is having considerable difficulty in breathing, we often resort to medicated steaming or medicated drops . . . [which are] soothing to the membranes and promote clearing of the passages." Bower, C. W.: Cornell Vet. *26*:87 (April) 1936.

TERRAMYCIN®

BRAND OF OXYTETRACYCLINE

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"From our first experience with Terramycin we decided that it would be a beneficial drug for the treatment of distemper. It had the ability to keep down the dangerous secondary invaders.

"We kept accurate records on the next 118 cases of dogs who were diagnosed clinically as distemper or distemper exposure cases. . . . All were given anti-distemper serum at 1½ cc. per lb. of body weight, plus Terramycin. Where gastritis or enteritis was a symptom, benzocaine plus cerium oxalate was dispensed. Owners were instructed to feed whatever the dog would eat, or force feed, and return in 48 hours for a check.

"One hundred and twelve were back to normal in 48 hours. Owners reported that the dog began to act better at the end of 24 [hours]. Multiple vitamins were dispensed until recuperated. None of these relapsed."

Vetter, R. F.: California Vet. *5*:15 (Jan.-Feb.) 1952.

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NEWS COMMENT

Nutrition Conference for Veterinarians

Nutrition as distinguished from feeding continues to be a primary concern of veterinarians charged with the maintenance of herd health in all classes of food animals. Convening November 6, the Nutrition Conference for Veterinarians sponsored by the Illinois State Veterinary Medical Association took bold steps to carry that message to practitioners. Other state groups are invited to study this conference approach.

Poultry Inspection Law

Inspection costs fade away from some 351 poultry processors January 1, 1958, when the government starts picking up the tab. Uncle Sam will also pick up the check in almost as many establishments that ship processed poultry interstate, or into areas under the law's jurisdiction as designated by the Secretary of Agriculture.

Consumption of poultry will go up. Normal population increase as well as consumer confidence in a wholesome product will account for pace setting poultry consumption. Although the law was passed primarily to protect the public, all indications point to better business for the poultry industry too.

Proposed Action Concerning the Veterinary Corps

Lame Duck action by former Secretary of Defense Wilson may wipe out the Veterinary Corps in both the Army and Air Force within 60 days.

Action came as a result of prolonged study and as apparent repudiation of advice from heads of the medical departments of both services, Congressional Armed Services Committees, and other segments of the legislative bodies. Timing of Mr. Wilson's action precludes intervention from appropriate congressional committees.

Swine Flu

Hog lots will be invaded by swine influenza during November and December, according to livestock health authorities. Almost as dramatic as Asian flu in the nation's human population, swine flu will strike suddenly and take a heavy toll.

Signs are: High fever, loss of appetite, thumpy breathing, coughing, mucus discharge from the eyes and nose, and prostration. Animals can recover in four to seven days when confined to clean, dry pens and given plenty of water and light.

As a preventive measure, authorities of the American Foundation for Animal Health advise keeping hogs away from old straw stacks, and recommend dry, draft-free quarters, and pasture rotation.

VETERINARY Medicine

Established 1905

Registered in U. S. Patent Office

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—EDITOR—
ROBERT L. ANDERES, B.S., D.V.M.

—ASS'T EDITOR and ADVERTISING MANAGER—
CHARLES WALTERS, JR., B.S., M.A.

—DEPARTMENT EDITORS—

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in chronic respiratory disease of poultry

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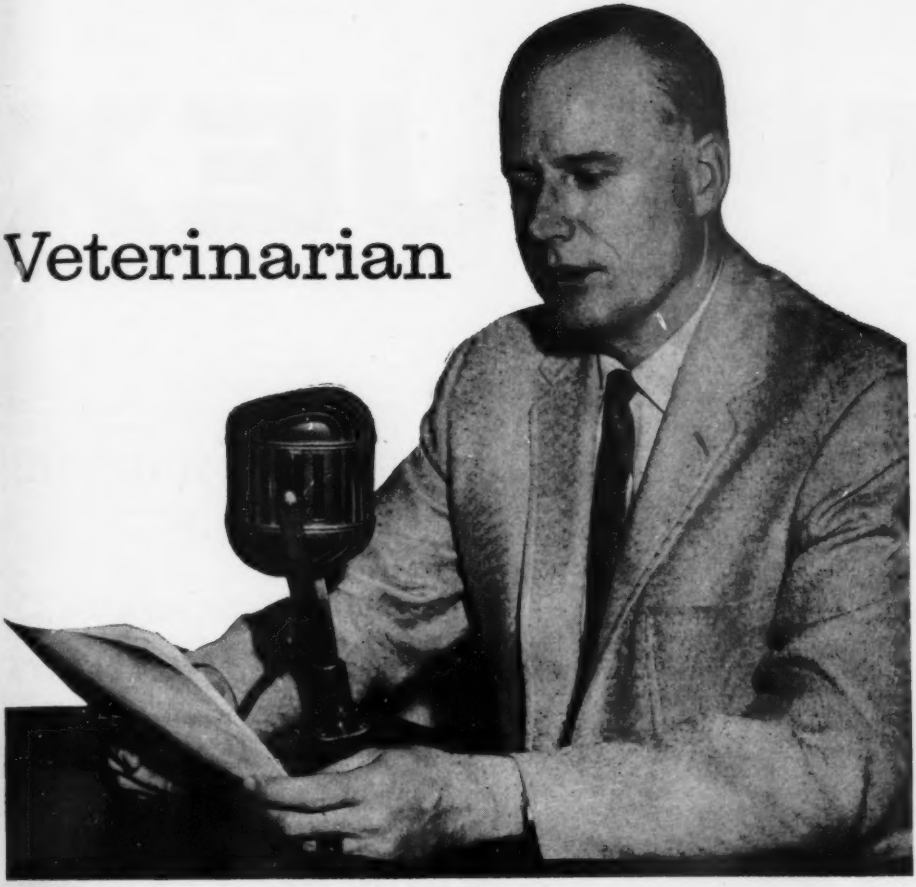

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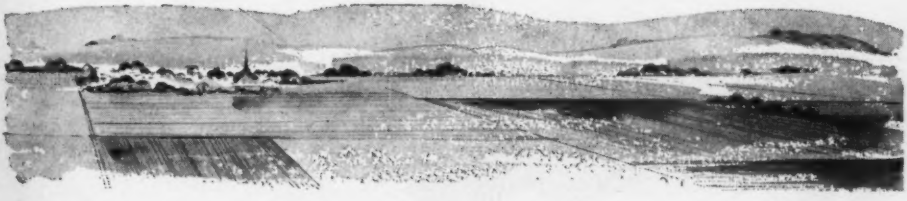

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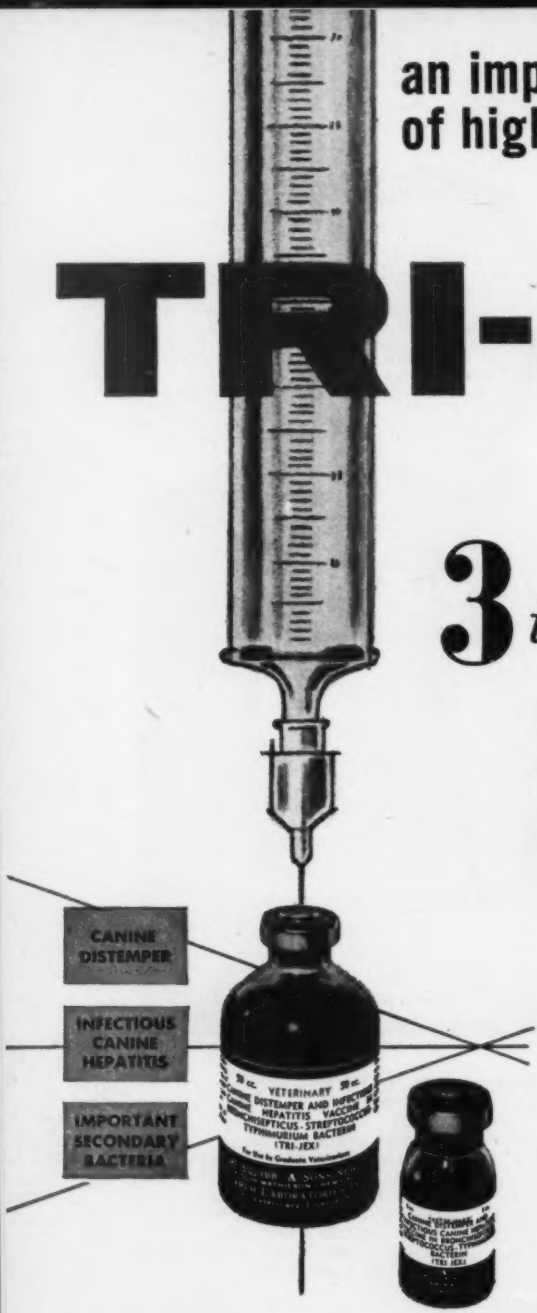

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*Jones, S. V.; Belloff, G. B., and Roberts, H. D. B.: Vet. Med. 51:413 (Sept.) 1956.

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REFERENCES: 1. Bull, W. S.: N. Amer. Vet., in press. 2. Henry, R. T., and Blackburn, E. G.: Vet. Med., in press.

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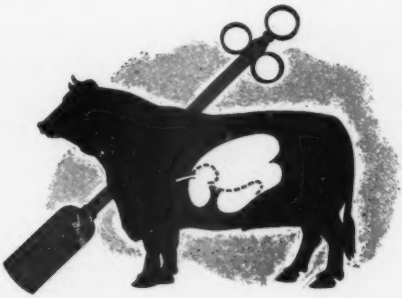

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CHECK inflammation promptly

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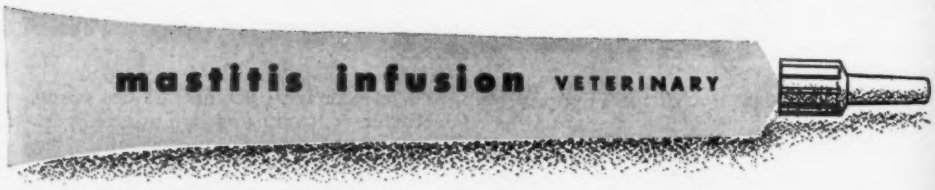

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Livestock are being increasingly exposed to poisoning by a great variety of complex and extremely toxic agents developed by agricultural technologists.

An example is the use-hazard of organic phosphate insecticides which the author discusses in this report of successful trials for a treatment of poisoned cattle and sheep.

The Treatment Of Organic Phosphate Insecticide Poisoning With Atropine Sulfate And 2-PAM (2-Pyridine Aldoxime Methiodide)†

GEORGE T. WOODARD,* D.V.M., Kerrville, Texas

ORGANIC phosphate insecticides have become popular during the past few years. One reason for this popularity is that the residue problem is less than that created by many of the chlorinated hydrocarbons. This problem can not be completely solved by the use of organic phosphates, however, but when residues occur the problem is apparently not nearly so great since the rate of elimination is much faster than that of residues created by chlorinated hydrocarbons. Another reason for the increased use of organic phosphate insecticides is that widespread reports indicate that many insects have developed a resistance to the chlorinated hydrocarbons but are readily destroyed by one of the organic phosphate insecticides; consequently, the greater portion of research in the field of insect control is being conducted primarily with organic phosphates.

It is generally accepted that the organic phosphates exert their effects on mammals principally by inhibiting the enzyme cholinesterase. The function of cholinesterase in the mammal is believed to be the destruction of acetylcholine by hydrolysis. The organic phosphates have some structural similarities to acetylcholine and are believed to have an attraction to the enzyme surface in much the same manner as acetylcholine; also, organic phosphates are hydrolyzed by cholinesterase just as acetylcholine. The important difference in these two processes is that the one involving the organic phosphates is generally stable, whereas the other is readily reversible, a normal physiological function. The process involving the organic phosphate inhibits the cholinesterase and thereby allows a buildup of acetylcholine, which blocks the neuromuscular impulses.[1]

Animals poisoned by the majority of organic phosphates usually demonstrate the following symptoms: Profuse salivation, with thin saliva; stiff-legged stance or gait, which is usually more pronounced in the hindquarters; dyspnea, open-mouth respiration; diarrhea, often blood-

†This work was conducted as a part of the cooperative projects on insecticide toxicology of the Animal Disease and Parasite Research Division and the Entomology Research Division of the Agricultural Research Service, U. S. Department of Agriculture, Kerrville, Tex.

*Animal Disease and Parasite Research Division, Agricultural Research Service, U. S. Department of Agriculture.

tinged; and trembling. There are several secondary manifestations, such as knuckling, tongue lolling, hypersensitiveness, and cyanosis, which sometimes fail to appear. These symptoms differ from those observed by Radeleff and Woodard[3] with Dow ET-57-poisoned animals.

As with most chemicals, the use-hazard will definitely increase the number of poisonings by the organic phosphates, and the veterinarian will be faced with another clinical problem on which little information is available.

The purpose of this paper is to give information on atropine sulfate and 2-PAM (2-pyridine aldoxime methiodide), two compounds that have shown considerable therapeutic value in the treatment of cattle and sheep poisoned by some of the organic phosphate insecticides which are being used extensively.

The insecticides used in this study are in one of the three major divisions, thiophosphates, thionophosphates, and pyrophosphates, with the majority being in the thiophosphate division.

Materials and Methods

Yearling cattle of predominantly Hereford breeding, with no particular attention to sex, were purchased at the local auction. They ranged in condition from good to poor, the majority being fairly thin due to the prolonged drought in the area. Treated animals, fed a maintenance ration consisting of alfalfa and cane hay, were held in observation pens for two weeks, and then turned to pasture and fed the same ration. Weekly observations and cholinesterase determinations were recorded.

Crossbred Delaine-Corriedale yearling ewes and mutton sheep were also used in this experiment. These sheep were raised at the Department's Camp Stanley Ranch and maintained on the same ration and under the same conditions as the cattle.

The cattle were poisoned by oral administration (drench) or dermal application of diazinon emulsions, parathion suspensions, or malathion suspensions. Diazinon was administered orally, in doses of 30 mg./kg., as a 3% emulsion prepared from 25% xylene-triton concentrate; parathion, in doses of 50 to 100 mg./kg., as a 5% suspension prepared from a 25% wettable powder; and malathion, in doses of 200 mg./kg., as a 10% suspension prepared from a 25% wettable powder. Also, diazinon was administered dermally to one animal as a 1% emulsion prepared from a 25% xylene-triton concentrate, and parathion, to one animal as a 0.5% suspension and to another animal as a 1% suspension prepared from 25% wettable powder.

The minimum toxic dose of diazinon, parathion, and malathion, administered orally to yearling cattle, is 25, 50, and 100 mg./kg.

TABLE 1. Therapeutic Value of Atropine Sulfate on Yearling Cattle Poisoned by Oral Doses of Parathion, 75 or 100 mg./kg., or Malathion, 200 mg./kg.

No. of animals	Atropine Sulfhate Total mg./kg.	No. of doses	Dose of Insecticide mg./kg.	Results	Remarks
			PARATHION		
1	0.15	1	75	Recov.	Satisfactory recov. not poisoned severely
3	1	2	75	Recov.	Satisfactory recov.
1	3	1	100	Recov.	Satisfactory recov.
1	9	4	100	Recov.	Repeated applications necessary to save animal
1	2	3	100	Died	Initial response good; later died from exhaustion
1	5	4	100	Died	Initial response good; later died from exhaustion
			MALATHION		
2	1	2	200	Recov.	Satisfactory recov.
1	1	2	200	Recov.	Mild symptoms of phosphate poisoning 24 hours later
1	2	2	200	Recov.	Repeated application necessary to save animal
1	2	2	200	Died	Initial response good; later died of exhaustion
1	1	2	200	Died	Initial response good; later died of exhaustion

respectively. Poisoning by these doses was not severe enough in most instances to indicate antidote therapy. After several other doses were tried, it was determined that diazinon, parathion, and malathion at 30, 100, and 200 mg./kg. respectively, severely poisoned over 98% of all subjects to the point that death was most probable had an antidote not been employed.

Sheep received the same formulation of parathion as did the cattle, and after a few preliminary tests at 50 and 75 mg./kg. the dosage was increased to 100 mg./kg. This dose severely poisoned 98% of all subjects to the point that symptoms indicated death would have ensued had an antidote not been administered.

The majority of the animals used in this experiment were poisoned by oral doses of 100 mg./kg. of parathion in suspensions.

The antidotes used in these studies were atropine sulfate and 2-PAM, the latter being reported to be a specific antidote for intoxication by alkylphosphates.[8] Each of these compounds was given by different routes, dosages, and formulations.

Atropine sulfate was dissolved in distilled water, and approximately one-third of the initial dose in 10 ml. of distilled water was administered intravenously and the remainder in 10 ml. of distilled water was given subcutaneously. Atropine is readily soluble in water at concentrations far greater than would ever be indicated. It was used at various concentrations in refined peanut oil to prolong its absorption time. It was difficult to suspend in peanut oil. The peanut oil was preheated to a temperature of 40 C.; the powdered atropine was added to a small portion of it and stirred until a white paste was formed; then the remainder of the peanut oil was added and thoroughly mixed until a fairly uniform suspension resulted. This mixture had to be held at 30-35 C. or it rapidly settled out. Atropine suspended in a total volume of 10-20 ml. of peanut oil was administered subcutaneously in the cervical region.

2-PAM was usually prepared as a 5-10% solution in physiological saline, and a dose of 50 mg./kg. was administered subcutaneously in the cervical region at the rate of 50 ml. per injection site. The saline was preheated to a temperature of 40-45 C. before the 2-PAM would dissolve, and the solution had to be held at a temperature above 35 C. to prevent recrystallization. 2-PAM was not readily soluble in saline, and lower concentrations made the volume too great.

What are Organic Phosphate Insecticides?

Following World War II, American scientists discovered records of organic phosphates developed by German chemists as nerve gases. They were prepared for use as anti-personnel weapons, but never were employed by the German Chemical Warfare Corps. Tests revealed the extreme toxicity of the vapor phases of these chemicals.

Since WWII, these chemicals have been subjected to intensive study and extensive experiments. A variety of compounds have been developed by chemical linkage of phosphorus with sulfur and other elements. Such compounds known generally as malathion and parathion were developed.

Developing resistance of insects to previously employed insecticides stimulated this research work and forced the inclusion of these highly toxic products into orchard and garden sprays, livestock sprays and dips, and insect powders.

The superior efficacy of these agents as insecticides that attack both livestock and plants, and their increasing use in formulations, have lessened fears of users, notwithstanding caution statements on labels.

It must be remembered that organic phosphate insecticides are among the most toxic chemicals known; that they are dangerous because of interference with nerve impulses; and that toxicity may result from inhalation, ingestion, or skin absorption.

Experimental Results

In the preliminary tests atropine appeared to be the ideal antidote for organic phosphate intoxication in cattle and sheep; however, after the dosage of the insecticide was increased, the results were indeed discouraging, for maintaining a poisoned animal under atropinization caused death from exhaustion in many instances. Apparently there is a point in both the poisoning and the atropine application in which each process becomes irreversible and the animal succumbs almost immediately. Any atropine administered after this process is established only adds coals to an already burning fire.

The results of treating poisoned sheep and cattle with atropine are encouraging, but atropine alone leaves much to be desired. (See tables 1 and 2.)

After various routes, dose levels, and combinations of atropine and 2-PAM were tried, it was determined that cattle poisoned by oral doses of parathion and diazinon responded satisfactorily by slowly administering 12.5-20 mg. of atropine sulfate dissolved in 10 ml. of distilled water intravenously and, immediately

followed by 37.5-50 mg. of atropine in 10 ml. of distilled water subcutaneously. After the atropine injections, the subjects were immediately given 50 mg./kg. of 2-PAM subcutaneously in the cervical region. The 2-PAM was dissolved in 100-125 ml. of saline, and not more than 50 ml. per site of injection was used. All cattle poisoned and treated by the above procedure made uneventful recoveries. (See table 3.)

Yearling cattle poisoned orally by 200 mg./kg. of malathion failed to respond satisfactorily to the antidote treatment described above; however, when additional atropine and 2-PAM were given at approximately six- to eight-hour intervals for two or three times, the results were encouraging, but not 100% effective.

Also, cattle sprayed with either 0.5% or 1% parathion failed to respond to repeated applications of atropine and 2-PAM, and washing the animals with copious amounts of water immediately after poisoning developed had no value in the final outcome. The initial response was satisfactory, but it seemed as though the animals absorbed the insecticide over a greater period of time and the exhaustion picture that was encountered when using repeated applications of atropine reappeared. Of these animals poisoned by dermal application, those receiving a total of 200 mg./kg. of 2-PAM and 250 mg. of atropine in divided doses 8-12 hours apart died. One heifer, poisoned dermally by 1% diazinon and then treated with atropine and 2-PAM and washed thoroughly, responded satisfactorily initially; however, four days later symptoms of phosphate poisoning returned, but these were controlled by 100 mg. of atropine suspended in 20 ml. of peanut oil and given subcutaneously.

TABLE 2. Therapeutic Value of Atropine Sulfate on Sheep Poisoned by Oral Doses of Parathion, 50 or 75 mg./kg.

No. of animals	Atropine Sulfate		Results	Remarks
	Total mg./kg.	No. of doses		
		PARATHION, 50 mg./kg.		
2	1	2	Recov.	Satisfactory recov.
1	2	1	Recov.	Satisfactory recov.
1	3	2	Recov.	Satisfactory recov.
2	4	1	Recov.	Satisfactory recov.
2	4	2	Recov.	Satisfactory recov.
4	10	2	Recov.	Satisfactory recov.
1	1	2	Recov.	Slow initial response
1	1	1	Recov.	Slow initial response
1	4	3	Recov.	Slow initial response
3	4	2	Recov.	Slow initial response
2	5	2	Recov.	Slow initial response
1	5.5	2	Recov.	Slow initial response
1	5.5	3	Recov.	Slow initial response
1	6	2	Recov.	Additional atropine required
2	8	3	Recov.	Additional atropine required
1	15	3	Recov.	Additional atropine required
1	20	7	Recov.	Additional atropine required
1	18	4	Recov.	Additional atropine required
1	25	3	Recov.	Atropine intoxication
1	1.5	3	Died	Initial response good; died 24 hours later
1	6	2	Died	Initial response good; died 24 hours later
1	15	3	Died	Initial response good; later died of exhaustion
		PARATHION, 75 mg./kg.		
1	4.5	2	Recov.	Satisfactory recov.
1	4	3	Recov.	Slow initial response
1	2.5	4	Recov.	Additional atropine required
1	20	7	Died	Initial response good; later died of exhaustion
1	25	4	Died	Initial response good; later died of exhaustion
1	34	4	Died	Initial response good; later died of exhaustion

Much time and effort was spent trying to develop one or a combination of these two compounds, which would effectively counteract poisoning in sheep by the organic phosphate insecticides. Atropine works satisfactorily in controlling the initial symptoms. It can be given by nearly any route, with good initial results; however, poisoned animals respond much more effectively when from one-third to one-fourth of the initial dose is administered intravenously and the remainder subcutaneously. The portion injected intravenously should be dissolved in 10 ml. of distilled water or physiological saline and administered slowly; that given subcutaneously should be dissolved in the same, or greater, volume of either vehicle. If a more prolonged action is desired, then the atropine suspended in 10-20 ml. of refined peanut oil should be injected subcutaneously.

To keep poisoned animals under atropinization requires four or five times more atropine for sheep than for yearling cattle. Of course, this is an important fact to remember in treating phosphate-poisoned sheep. The exact amount of atropine that each sheep will require to maintain atropinization varies with the individual and the degree of poisoning. In most cases, 4-6 mg./kg. given in two or three doses was the most effective treatment. The initial treatment of 2 mg./kg., one-third of the dose administered intravenously and the remainder subcutaneously, proved to be the most effective. This usually controlled symptoms of phosphate intoxication for four to six hours, at which time 2-4 mg./kg. in 20 ml. of peanut oil was injected subcutaneously. Any additional atropine required was suspended in peanut oil and administered subcutaneously. (See table 2.)

2-PAM was tried exhaustively in sheep by various routes and dose levels in combination with atropine, with disappointing results. (See table 4.)

Discussion

Much work has been done using atropine sulfate to alleviate the symptoms of nerve gas poisoning in man by keeping the poisoned subject under atropinization. Since the organic phosphate insecticides belong to this group, it was assumed that atropine would counteract the symptoms of organic phosphate poisoning in cattle and sheep, and this it does for a limited period.

It is extremely difficult, if not impossible, to maintain poisoned animals under a uniform, desired degree of atropinization because of many factors, such as individual susceptibility, degree of intoxication, species, and other conditions that are not known. In many cases, poisoned animals under atropinization become exhausted and die. On the other hand, if atropinization is not maintained, symptoms of organic phosphate insecticide poisoning reappear and the animals succumb to the insecticide.

TABLE 3. Therapeutic Value of Atropine Sulfate and 2-PAM on Yearling Cattle Poisoned by Oral Doses of Parathion, 75 or 100 mg./kg.

No. of animals	Atropine Sulfate		2-PAM		Results	Remarks
	Total mg./kg.	No. of doses	Total mg./kg.	No. of doses		
			PARATHION, 75 mg./kg.			
2	1	2	50	1	Recov.	Satisfactory recov.
1	0.45	2	50	1	Recov.	Satisfactory recov.
			PARATHION, 100 mg./kg.			
1	0.8	2	20	1	Recov.	Atropine intoxication
1	1.2	5	54	3	Recov.	Additional atropine and 2-PAM required
1	0.43	3	50	3	Recov.	Additional atropine and 2-PAM required
1	0.36	3	25	1	Recov.	No initial response, additional atropine required
1	0.21	2	25	1	Recov.	Mild symptoms of phosphate poisoning 24 hours later
6	0.25	2	25	1	Recov.	Satisfactory recov.
8	0.34	2	50	1	Recov.	Satisfactory recov.

Since information as to the toxicity or nontoxicity of atropine for normal sheep and cattle was not available, one sheep was given 125 mg. intravenously, 212 mg. intraperitoneally, 100 mg. intramuscularly, and 275 mg. subcutaneously. The objective symptoms were depression, weakness, pupil dilation, decreased respiratory rate, and frequent urination. The most outstanding physiological action of atropine is general debility of only a few hours' duration.

Cattle are much more susceptible to atropine than sheep, for 100 mg. of atropine injected by any route is enough to produce symptoms of intoxication in most normal subjects. The symptoms of atropine intoxication follow the pattern of those seen in sheep with the exception of depression. Cattle become extremely restless and hallucinations appear; however, these conditions may be a result of severe photophobia, which appears to be extremely painful.

Soon after the disappointing results with atropine and the report that 2-PAM was a specific antidote for alkylphosphate intoxication, the Pesticide Chemicals Research Section of the Entomology Research Division formulated 2-PAM according to the method generously provided by Irwin B. Wilson of Columbia University and sent it to the Kerrville laboratory for testing. It was thought that 2-PAM would probably have some therapeutic value in the treatment of animals poisoned by some of the widely used organic phosphate insecticides.

It should be kept in mind that atropine alleviates only the symptoms of organic phosphate insecticide poisoning, whereas 2-PAM is reported to counteract the actions of the poisoning by destroying phosphoryl enzymes that have been formed, thus assisting in the reactivation of cholinesterase, which in turn destroys the excess acetylcholine. The normal physiological process then returns wherein cholinesterase assists in the destruction of acetylcholine and the gap is bridged whereby nerve impulses are carried to the musculature as before poisoning.[3]

Since no information as to the toxicity of 2-PAM to mammals was available, four yearling cattle were each treated with a 50 mg./kg. dose of 2-PAM in 100 ml. of physiological saline, two of the cattle being injected intraperitoneally and two intravenously. All exhibited some restlessness and mild abdominal distress, but these symptoms were mild and of short duration.

TABLE 4. Therapeutic Value of Atropine Sulfate and 2-PAM on Sheep Poisoned by Oral Doses of Parathion, 100 mg./kg.

No. of animals	Atropine Sulfate		2-PAM		Results	Remarks
	Total mg./kg.	No. of doses	Total mg./kg.	No. of doses		
1	2	2	25	1	Recov.	Satisfactory recov.
1	0.75	2	50	1	Recov.	Satisfactory recov.
3	2.5	2	50	1	Recov.	Satisfactory recov.
1	3	2	100	1	Recov.	Satisfactory recov.
1	2	2	25	1	Recov.	Additional atropine required, also artificial respiration
1	4	2	50	1	Recov.	Additional atropine required
1	2	2	58	2	Recov.	Additional atropine required
1	1	2	100	2	Recov.	Additional atropine required
1	3	2	125	2	Recov.	Initial response good, additional atropine required
1	2	2	100	1	Recov.	Initial response good, additional atropine required
1	3	2	25	1	Died	Initial response poor, died of exhaustion
1	1	2	50	2	Died	Initial response good, died 24 hours later
1	2.5	2	50	2	Died	Initial response good, died 24 hours later
1	4	2	100	1	Died	Initial response good, died 4 days later
1	5.5	2	125	2	Died	Initial response good, died 3 days later
1	2	2	150	2	Died	Initial response good, died 24 hours later
1	2	2	150	2	Died	Initial response good, died 24 hours later

One sheep given 25 mg./kg. of 2-PAM intravenously demonstrated the same symptoms as the cattle, plus increased respiratory rate and an excessive flow of saliva. The RBC cholinesterase was determined for a period of two weeks, with no change in the normal values of any of the above-mentioned animals. Apparently 2-PAM is a relatively non-toxic compound for both cattle and sheep.

It appears that 2-PAM is a much more powerful reactivator of cholinesterase in animals poisoned by some of the organic phosphate insecticides than by others, because it works satisfactorily in conjunction with atropine as an antidote for cattle poisoned by oral doses of parathion but does not work satisfactorily for cattle poisoned by oral doses of malathion.

Cattle given oral doses of parathion followed immediately by 2-PAM by various routes and dosages failed to show any protection from this antidote. The compound 2-PAM also failed to protect when it was given after severe symptoms of poisoning developed. If these animals had not been treated with atropine, they would have succumbed to the organic phosphate insecticide poisoning. However, after receiving atropine, the animals responded immediately and recovered without additional therapy. This was in contrast to the pattern set by most of the animals treated with atropine alone. These observations prompted the investigation of a possible combination of atropine and 2-PAM—the atropine to alleviate the symptoms and the 2-PAM to counteract the effects of the cholinesterase inhibitor.

Poisoned cattle or sheep did not respond satisfactorily to 2-PAM alone; however, a combination of atropine and 2-PAM gave encouraging results on phosphate-poisoned cattle but not on phosphate-poisoned sheep. (See tables 3 and 4.)

Cholinesterase values were followed on all cattle and sheep used in this experiment, observing one outstanding finding. Cattle poisoned by one of the organic phosphate insecticides and then treated with atropine and 2-PAM had a much higher value 6-24 hours after poisoning than did animals treated with atropine alone. However, there seemed to be no difference in the final recovery rate of poisoned animals receiving no antidote, atropine alone, 2-PAM alone, or a combination of 2-PAM and atropine.

The significance of the higher cholinesterase value, during the 6- to 24-hour period, in the cattle treated with the combination antidote is difficult to evaluate. The most probable assumption is that the greater portion of the 2-PAM is destroyed within this period.

Summary

The most effective antidote for yearling cattle poisoned by oral doses of 100 mg./kg. of parathion suspension or 30 mg./kg. of diazinon emulsion is a combination of atropine sulphate and 2-PAM (2-pyridine aldoxime methiodide) administered as soon after poisoning develops as possible. Atropine should be administered in two doses—12.5-20 mg. and 37.5-50 mg. each dissolved in 10 ml. of distilled water. The smaller dose should be administered intravenously and slowly, whereas the larger should be given subcutaneously; 2-PAM in a 50 mg./kg. dose suspended in 100-125 ml. of physiological saline should be administered subcutaneously in the cervical region, using not more than 50 ml. per injection site. If symptoms of organic phosphate poisoning return, or the animal does not respond satisfactorily, this procedure should then be repeated, keeping in mind not to overtreat.

The best procedure to follow in treating sheep poisoned by one of these insecticides is with repeated applications of atropine, attempting to maintain the animal under atropinization. In most cases, 4-6 mg./kg. of atropine in two or three doses is the best therapeutic treatment. An initial application of 2 mg./kg., one-third being given intravenously in 10 ml. of distilled water and two-thirds subcutaneously in the same volume of distilled water, has proved to be the most effective. This usually controls symptoms for four to six hours, depending on the individual and the severity of intoxication by the poisoning agent. The remainder of the atropine should be given subcutaneously in divided doses, not more than 4 mg./kg. per treatment, in 20 ml. of refined peanut oil. If more atropine is indicated, it should be suspended in peanut oil and administered subcutaneously.

In treating poisoned sheep, it is well to remember that sheep tolerate four or five times the quantity of atropine that cattle do; however, an excess of atropine is worse than not enough because of its exhaustive powers on poisoned subjects.

From the foregoing statements it is obvious that the pitfalls that may be encountered in the treatment of animals poisoned by organic phosphate insecticides are many; however, atropine and 2-PAM are definitely helpful in cases where animals are poisoned by some of these

insecticides. Therefore, since the use-hazard of the organic phosphate insecticides is increasing, these two compounds have a definite place in the veterinarian's armamentarium of therapeutic agents.

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Further Report of Leptospira Agglutinins in Blood of Horses

ROSALTHA H. SANDERS,* Ph.D.,
New York, New York

In the course of our examination of horse blood samples submitted to this laboratory, for various diagnostic procedures, we have had the opportunity to study a special small group. This group consists of serum samples from mares from a breeding farm in Puerto Rico, submitted for pregnancy tests. As a matter of general interest, agglutination tests against three Leptospira antigens were performed on these sera. The results have not been reported previously. The work was done between the dates of June 28, 1956 and August 9, 1957.

The methods used were the same as those described in our previous report,[2] except that all antigens were formalinized, and the antigen suspensions were diluted to a suitable density for use in equal amounts (0.5 ml.) to the volume of diluted serum. The dilution range for the sera was 1/10 to 1/10,000 in multiples of 1/10, with 1/200 and 1/400 dilutions inserted in the series. All 56 sera were tested against *Leptospira pomona* antigen, 46 of these were also tested against *L. icterohemorrhagiae* and *L. canicola* antigens. Descriptions by Wolff[3] and Gsell[1] were used as guides in evaluating reactions. Adequate controls were used with each lot of sera tested.

We again find positive reactors to *L. canicola* antigen, as in our first group of horses reported earlier. It is interesting also to note the large percentage of positive reactors in a group of mares considered suitable for breeding purposes. Work on blood sera from this source is continuing.

We wish to thank Dr. Abram Stavitsky, Department of Microbiology, Western Reserve University, for the rabbit antiserum used in this and previous work from this laboratory[2] and for some of the antigens used. We are also indebted to Dr. Henry Vogel, New York City Department of Health, for furnishing the *L. icterohemorrhagiae* antigen used in this report.

*Veterinary Diagnostic Laboratories, 3 East 65th St., New York 21.

TABLE II. Sera Reacting Simultaneously to All Three Antigens Used

Category	Number of sera
Negative to all 3 antigens	13
Negative or "doubtful" to 3 antigens	17
Positive reactors to 3 antigens	7

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Dairy husbandmen at Colorado are installing electric lights in dairy barns to learn what effect, if any, night lighting might have on milk production.

TABLE 1. Summary of Agglutination Tests of 56 Horse Sera Against Leptospira Antigens, Indicating Numbers of Sera in Each Category

Antigens	Negative	Doubtful (Titer=1/10)	Positive reactors* 1/100	1/200	1/400	1/1000	1/10,000	Unclassified** (a)	*** (b)	Total Serum Samples	Positive %
L.pomona	28	13	10	1	0	3	0	0	1	56	23
L.icterh.	20	7	12	0	0	0	0	6	1	46	26
L.canicola	18	6	14	2	0	0	1	4	1	46	27

*Positive reactors are herein designated as those sera which have a 1+ reaction at 1/100 titer or above, with reactions increasing in intensity at successively lower titers.

**An unclassified reaction reported here (a) positive at 1/100, with no reading available at 1/10 titer; or (b) 1+ reaction at 1/100 titer or above with weak reactions at lower titers.

***Due to temporary shortage of antigens, the 1/10 dilution was not prepared from 18 sera, eight of which were negative at titers of 1/100 and above, while ten had reactions of 1+ to 2+ at 1/100 and 1/200 titers.

Fig. 1. Feet with interdigital overgrowths.

An Investigation Of Bovine Interdigital Overgrowth

W. H. CHIVERS,* D.V.M., Ames, Iowa

A common condition affecting the feet of cattle is known to the stockman as "corns." This is an interdigital overgrowth occupying the space between the claws as a proliferation of the interdigital tissue and integument. Affected animals show varying degrees of lameness corresponding loosely to the number and extent of the visible growths. Lameness reduces value of animals for exhibition or sale and often greatly reduces activity. Overgrowths are frequently traumatized and thus become avenues for infection.

The overgrowth is a mass of tissue continuous with the interdigital tissue and covered by the hairless integument found between the claws. It consists principally of fibrous connective tissue with some fat and is comparatively avascular. They vary in size from short to a length equal to or longer than the claws and sometime are so long that they are trod on.

Removal is usually by surgery; less often by escarotics. Surgery involves problems of restraint of these large animals, aseptic preparation of a dirty and unexposed area, anesthesia, surgical removal of growths and wound dressings. It has the advantage of being precise and controlled. Escharotic applications are not precise or controlled in that region, and results are usually unsatisfactory.

Cause of Interdigital Overgrowths

This project was set up as an attempt to ascertain the cause of interdigital overgrowths with a view to avoiding or preventing their appearance. To this end *x*-ray pictures were to be taken of the feet of such animals as were presented to the Iowa State Veterinary Clinic for treatment or removal of interdigital overgrowths. Also included in the project were to be a number of *x*-ray pictures of the feet of similar type cattle that did not have interdigital overgrowths for the purpose of comparison.

Beef type bulls in general and cows and steers in high condition are the most frequently affected animals although some large dairy bulls are observed with this condition.

Fig. 2. X-ray of normal foot.

*Assistant Professor, Department of Veterinary Medicine and Surgery, Iowa State College.

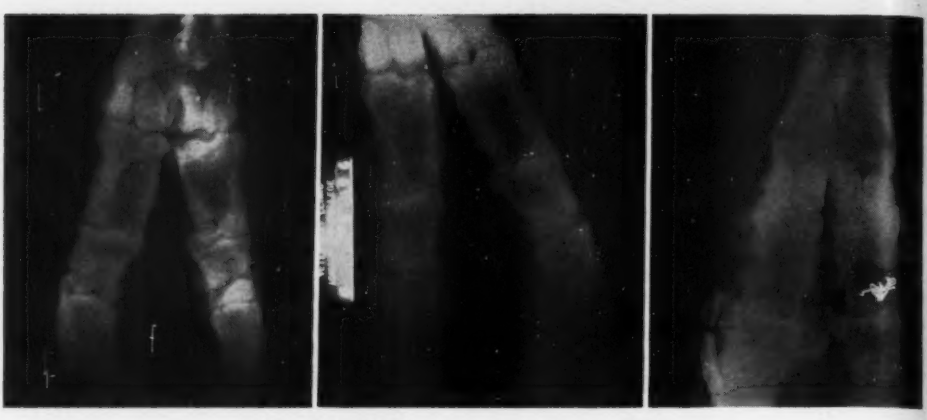

Fig. 3. Interdigital overgrowths of varying severity.

X-ray pictures were taken of 36 feet that exhibited interdigital overgrowths and of 16 feet free of any sign of overgrowths. These 16 feet were adjudged clinically to be normal and the animals were not lame.

The outstanding lesion observed in the *x*-ray plates of affected feet was exostosis of the interdigital areas of the first and second phalanges. This lesion was usually plainly evident. The interdigital exostosis was also found in some of the feet adjudged to be normal clinically. Other bone pathology noted was periarthritis, arthritis, and ankylosis. These were likewise noted in some clinically unaffected feet. Small or fine bones were common and many of these showed poor quality or lack of density.

Affected feet—36: With exostosis, 81%; with all lesions, 90%.

Unaffected feet—16: With exostosis, 7%; with all lesions, 13%.

Visualization of what occurs is that when weight is put on a foot there is a spreading of the digits. In animals where this spreading or separating strain is in excess of the ability of the various structures to absorb it interdigital ligaments pull on the phalangeal periosteum, producing a chronic periostitis followed by exostosis. The spreading action tends to increase the interdigital space which is filled in with a soft tissue composed principally of connective tissue and fat. When weight is removed digits tend to draw together. This action occurs repeatedly during ambulation with a pincers effect tending to force the interdigital tissue in the direction of least resistance, which is downward. The chronic inflammation promotes hyperplasia and the result is an interdigital overgrowth.

The cause of interdigital overgrowths appears to be derived from two interacting sources. First, hereditary in that small or lightboned animals are selected for breeding purposes so that a neater appearing animal with a higher dressing percentage is developed. The second source is nutritional, in that quality of bone is too frail to withstand the applied stresses.

Perhaps a program of selection combined with an improved nutritional program intended to improve bone metabolism would eventually reduce the incidence of animals lamed or disfigured by interdigital overgrowths. Also a modification of judging standards to require something less than extreme obesity, especially during the developmental stages of an animal's life might cause less strain to be placed on the supporting structures and result in a larger percentage of normal active animals.

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Drug Residues in Milk

The August 1957, *Public Health Reports* of the U. S. Department of Health, Education and Welfare indicates that "more than 60% of market milk samples collected ***** contained residues of chlorinated organic insecticides such as DDT, BHC, DDD, lindane, and methoxychlor. For example, market milk may contain 1.5 p.p.m. of DDT or related compounds. It is indicated that these pesticides in milk may have originated as a result of spraying cattle or their housing, and/or from the consumption of forage containing residues of one of these pesticides.—*R. R. Dykstra, D.V.M.*

Leptospirosis II. Clinical Evaluation Of Terramycin In Natural Outbreaks Of Porcine Leptospirosis

C. E. BAKER,* D.V.M., and M. J. GALLIAN,* B.S.,
Terre Haute, Indiana

THE economic importance of leptospirosis in swine has been shown in several studies.[1,2,3] The effectiveness of terramycin® given in the feed in eradicating the carrier state in swine artificially infected with *L. pomona*, has been reported earlier.[4] This antibiotic, fed for seven days at either 500 gm. or 1,000 gm. per ton of complete feed, eliminated urinary shedding of the organism in non-breeding swine of mixed sex.

On the basis of these findings, the present study was initiated on eight Indiana and Ohio farms on most of which there had been a history of a high abortion rate and birth of weak pigs and on all of which herd agglutination-lysis tests were positive for *L. pomona*. The purpose of this study was to determine whether short-term high-level feeding of terramycin to farm herds where leptospirosis was known to be present would reduce the incidence of abortions and enhance the viability and weight gains of the young pigs.

Materials and Methods

Arrangements to test terramycin-medicated feeds were made in cooperation with the farm operators and attending veterinarians. On each farm, pretrial blood samples were taken from 25 to 50% or more of the herd for serological tests. Preliminary serum tests and laboratory animal inoculations were made on the farms through facilities of the Pfizer mobile veterinary laboratory (fig. 1). Sera screen-tested in low dilutions in the field were refrigerated and taken to the Pfizer Veterinary Bacteriological Laboratories for complete titrations. In some cases replicate blood samples were sent to the laboratories of Ohio State University and Purdue University for parallel determinations of antibody content. All swine from which blood samples were taken were ear tagged for identification.

TABLE 1. Composition of Gestation Ration

Ingredient (High fiber — 15.2% protein)	%
Yellow corn	45.0
Oats	30.0
Bran or middlings	2.25
Soybean oil meal (45%)	20.0
Ground limestone	1.4
Dicalcium phosphate	0.5
Trace-mineralized salt	0.6
Vitamin mix	0.25

From six to ten pretrial urine samples also were collected from each herd to test for the presence of spirochetes. Laboratory procedures utilized in agglutination-lysis tests and for the isolation of leptospires from urine by transfer through guinea pigs have been described in an earlier report of Baker, *et al.*[4]

Feeding Plan

From each herd under study there was made up a treated group and a nontreated group of approximately equal size. In each group, from 25 to 100% of the animals were those which had been blood-tested initially and ear tagged. On all farms except no. 1 and 7, one or two boars were included in each group.

Both nontreated and treated lots received a complete feed gestation ration of a composition such that the urine would remain at about pH 7.5. The composition of this ration is set forth in table 1.

For 14 days the feed of the treated groups was medicated with 500 gm. terramycin per ton. Intake of the antibiotic in these groups ranged from 5.0 to 6.25 mg. per lb. body weight per day.

Procedures During and Following the Feeding Period

Urine samples were collected on the fifth and tenth days of treatment by local attendants and were shipped under refrigeration to the Pfizer Agricultural Research Center to be assayed for terramycin content. Urine samples

*Both authors with Chas. Pfizer & Co., Inc., Terre Haute, Ind., when study was conducted. Senior author now is associate director, Central Experiment Station, Dept. of Agriculture and Commerce, Republic of Liberia.

®Chas. Pfizer & Co., Inc., Brooklyn, N. Y.

were taken at the end of the trial to be tested for presence of the spirochetes. Seven days after discontinuing terramycin-medicated feed, blood samples were again collected from the tagged swine for serological examination.

Results

Sera from some terramycin-fed groups revealed a decrease in antibody titer, whereas rising titers were common in some untreated groups, but this behavior was not consistent. As a whole, these serological results were too erratic to indicate trends. This was confirmed by the results obtained on the replicate samples tested by university laboratories.

Urine tests for the presence of leptospires yielded but little data, isolations of the organisms being made before trials on two farms and after trial from the untreated group on one of these same farms. This may have been due to an abbreviation of procedure necessitated by field conditions in that only single inoculations were made into guinea pigs. It is pertinent that other investigators have encountered difficulties in isolating leptospires. Delay *et al.*[5] studied abortions in three swine herds and were unable to recover the organism from aborted fetuses.

In the previous study,[4] conducted in close proximity to the laboratory, guinea pigs were given repeated inoculations of urine, sometimes as many as five, for assurance of transfer of infection. With those intensive procedures, there was clear-cut evidence that 500 gm. of terramycin per ton of ration for seven days eradicated urinary shedding of the organisms. This having been demonstrated in this earlier study, the field trials contribute information on the effect of feed medication upon reproductive success in the presence of leptospirosis. Therefore, the present study was evaluated mainly by comparing numbers of abortions and birth and weaning weights and viability of young between treated and nontreated groups during and following the feeding of terramycin. Reproductive data for the individual herds follows. Numbers of animals in the respective groups are those at the start of the feeding regimen.

Herd 1. In this herd in which pretrial tests demonstrated leptospires in urine, 125 of 270 bred gilts had aborted a few weeks before initiation of the study. Figure 2 shows one in the process. The trial was set up with 29 bred females in the treated group and the same number in the untreated group.

Average urine terramycin levels at the fifth day in the treated group were 7.3 micrograms per ml. and at ten days 6.4 micrograms per ml. Pretrial tests demonstrated the presence of leptospires in urine. At the end of the feeding period, the organisms still were detectable in the urine of the nontreated but not of the treated animals.

On this farm, pasture breeding was practiced and the animals farrowed in open sheds. It was therefore not possible for the owner to provide systematic figures on abortion and death losses. Birth weights of young farrowed by the treated group were estimated to be from 2.5 to 3.0 lb., whereas for the untreated they ranged from 1.5 to 2.0 lb. Weights of pigs from the treated group at four weeks of age averaged 20.3 lb. and from the untreated 16.5 lb.

Herd 2. Brucellosis was found to be present to a degree which overshadowed leptospirosis. This herd was not studied further.

Herd 3. Prior to the establishment of the study, approximately 40% of the brood animals

Fig. 1. Mobile veterinary laboratory utilized in conducting field trials.

had aborted or had produced pigs which did not survive. There were 13 bred females in each group. The attending veterinarian estimated that the offspring of terramycin-fed mothers were stronger and slightly heavier than those of the untreated.

Herd 4. It was known that the females in this herd had been exposed to infected boars. There were 23 bred females in the untreated group and 25 in the treated group. One sow in the untreated group aborted during the observation period, but there were no abortions recorded in the treated group. Terramycin urine levels were 10.3 micrograms per ml. and 9.1 micrograms per ml. at five and 10 days, respectively.

Herd 5. Following introduction of four new boars, 27 of 49 females had aborted in this herd. Detailed records on reproduction were kept throughout the feeding trials and are illustrated in table 2. There were 23 supposedly bred animals in each group when the terramycin feeding program was begun, but several which were found to be nonpregnant and some which had an intercurrent bacterial infection were removed from the trial. No abortions occurred in either the treated or the untreated group, but in one litter in the untreated group, five of 14 pigs were born dead. These dead pigs were enveloped by yellow membranes resembling those which characterized fetuses aborted by females on this farm prior to the start of the test. Only one pig was born dead in the treated group. The treated group was definitely superior with respect to percent of pigs surviving until weaning and average weaning weight. The superiority in average birth weight of the offspring of the terramycin-fed sows, although slight, was found to be statistically significant. The superiority in weaning weights of offspring of both sows and gilts fed terramycin also was found to be statistically significant.

Fig. 2. Sow aborting as a result of leptospirosis.

Herd 6. This herd was located near herd no. 5 and had a history of abortions after acquiring a boar from the same source. There were 22 bred females in the untreated group and 21 in the group treated. Three untreated sows aborted, but there were no abortions among the treated ones.

Herd 7. There was no history of abortion in this herd, but the presence of antibodies against *L. pomona* was detected in a routine health examination by the local veterinarian. The organism also was found in the urine prior to treatment, but was not isolated from the urine of either group post-treatment. Average birth weights of pigs from the untreated group were 2.3 lb., whereas for those from the treated

TABLE 2. Effect of Terramycin in Feed on Reproductive Performance of Swine Naturally Infected with Leptospirosis (Herd No. 5)

	Untreated			Terramycin 500 gm./ton feed		
	Sows	Gilts	Total	Sows	Gilts	Total
No. farrowings during observations	12	6	18	3	8	11
No. abortions	0	0	0	0	0	0
No. normal farrowings	12	6	18	3	8	11
No. pigs born dead	9	0	9	1	0	1
No. pigs born alive	129	59	188	35	70	105
Born dead, %	6.5	0	4.6	2.8	0	1.0
Born alive, %	93.5	100	95.4	97.2	100	99.0
No. pigs born alive, died prior to weaning	24	6	30	6	3	9
Born alive but died prior to weaning, %	18.6	10.2	16.0	17.1	4.3	8.6
Average birth weight, lb.	2.96	2.92	2.94	3.13*	2.93	3.03
Average no. pigs born alive per litter	10.75	9.83	10.44	11.67	8.75	9.35
Average no. pigs born dead per litter	0.75	0	0.50	0.33	0	0.09
Average weaning weight, lb.	31.72	23.62	27.67[a]	35.70*	33.72*	34.71[b]

*Significant over untreated. a. Av. 12 litters b. Av. 7 litters

group the average was 3.0 lb. According to the owner and the attending veterinarian, the pigs from the terramycin-fed mothers were healthier, demonstrated higher livability and made better gains during the observation period than offspring of untreated mothers. Particularly poor litters were farrowed by three females of the untreated group. These litters aggregated 20 pigs, all of which were weak, 13 surviving only two weeks.

Herd 8. There was a pretreatment history of abortion and birth of weak pigs in this herd. Two of the 12 females in the untreated group aborted and one produced five small, weak pigs which soon died. There were no reproductive difficulties among the 12 females in the treated group, although one sow was found to be in heat and not pregnant. A sampling of birth weights indicated an average of 3 lb. for the untreated group and 3.65 lb. for the treated.

Discussion and Conclusions

Terramycin was fed for 14 days at 500 gm. per ton of total ration to groups of gestating sows and gilts and some boars on seven farms where there was evidence of infection with *L. pomona,* as shown by serological tests in all and in some by occurrence of abortion storms and by isolation of organisms from urine. As untreated controls, an equal number of swine from each herd was maintained on the same ration without terramycin. In the terramycin-fed groups, as compared with the untreated, there were fewer abortions (three comparisons); less mortality of newborn pigs (three comparisons); greater birth weights (five comparisons, sows only in one); greater weaning weights (three comparisons); and greater health and livability of offspring (three comparisons).

From these observations, and from the data of the earlier study in which eradication of urinary shedding of organisms was accomplished as a result of seven-day feeding of terramycin at 500 gm. per ton of ration, it is concluded that a program of high-level, short-term terramycin feeding to pregnant sows and gilts can significantly reduce losses from leptospirosis in this species.

According to Gambrel *et al.*,[5] who studied aborted fetuses in an outbreak of porcine leptospirosis, the damage had occurred two to three weeks prior to abortion, and the abortions occurred one or two weeks ahead of projected farrowing dates. On this basis, it would appear that the most advantageous time to start high-level terramycin feeding is about one month prior to farrowing if records permit such forecasting. However, even if abortions have occurred to some extent in earlier-farrowing pigs of the herd, institution of such a feeding program should help reduce losses from abortions in the later-farrowing animals and help produce larger and more viable offspring than there would be without this antibiotic in the feed.

Acknowledgments

Assistance in these field experiments came from several sources. We are indebted to Dr. Russell Jones of Purdue University, Dr. E. H. Bohl of Ohio State University, Drs. Jeffry Airey, G. V. Keller, H. N. Heath, D. T. Buck and Robert J. Cloud, practicing veterinarians, for their assistance. Our thanks go also to Messrs. Robert Brown and Ray Strole for their help, Dale Biliman for antibiotic assay, and Dr. J. C. Atkinson for statistical analysis of the data.

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Intromission Phobia

Intromission Phobia in the Bull designates an article in *The Veterinary Record* in which the writer discussed the usual conditions that prevent animals from properly, or not at all, performing the sexual act. Amongst the usual causes, the writer recognized adhesions, trauma, hind limb defects, et cetera. It is interesting to note from the author's observations that in the absence of all the other usually recognized etiological factors there is a psychological basis — the exact nature unknown — that causes bulls with plenty of sex urge to stop almost at the moment of vaginal entry. As the author indicates, "The condition appears to be an inhibition which virtually defies removal once established, and shows the need to acquire greater understanding of the psychology of cattle."

A Breeding-Rest Fertility Program†

WILLIAM G. HUBER, B.S., D.V.M., M.S., Cissna Park, Illinois

THE repeat breeder cow ranks as an important cause of economic loss in dairy herd operation. Recognition of this loss is not dramatic or sudden. Many times it is discovered only when it spells the difference between success or failure of the entire operation. This loss should be made more apparent to the dairy farmer. The large animal practitioner can develop a program that will be of mutual benefit to the dairy farmer and the veterinarian. It is a facet of veterinary service that fits into the economic picture of demand for services, and it is a facet not subject to encroachment from non-professional sources since it is based on diagnostic skill and technic. It is a culmination of almost every course in the veterinary curriculum, and the technic must be learned by applying a veterinary education.

Many dairymen do not realize the economic waste occasioned by repeat breeders, except that they find cows with extra long dry periods. A stimulus must be provided for livestockmen to have a planned breeding program and a program to keep losses from infertility at a minimum. It is hoped that the veterinary profession will supply the stimulus through an intensive education program to the dairymen. Such a program must, among other things, point out the losses and the need for prompt diagnosis. Veterinarians can perform a useful service to the dairyman, and one that has a better than average financial return when compared to other professional efforts. Infertility and pregnancy examinations can be performed by any practitioners with a minimum of practical experience.

Purpose of Investigation

The purpose of this investigation was to determine the efficacy of uterine infusions during the breeding-rest period at 20 to 45 days postpartum. This efficacy was evaluated in the number of breedings per conception and the number of early hormonal and pathological diagnosis made at the time of uterine infusion.

Sample of Breeding Record

The following information provides the elements of an adequate breeding record:

Date of calving (estimated): June 6, 1958.

Owner: Robert J. Smith.

Breed: Guernsey; Age: 5 yr.

Previous History: Ketosis 6/57, etc.

Infused: July 15, 1958, right horn 2 X as large as left horn. Suggest retreatment on August 15.

Method of Investigation

Four grade A dairy herds were selected to receive uterine infusions during the breeding-rest period. Three were bred by artificial insemination and one by natural service. A complete breeding record of every cow was kept on a card in the office, and these cards were filed according to estimated or actual calving dates. At the first of the current month the cows that had calved during the previous month were noted and an appointment was made with the dairy farmer to infuse these cows at approximately 20 to 45 days after calving, or in other words at the middle of the next month. There would be at least three or four cows in each herd and the appointments with the various farms were made close together to keep traveling time at a minimum. The dairyman was also advised to leave cows ready for pregnancy examination in the barn along with animals to be infused. Thus, in addition to establishing a monthly breeding-rest infusion program, monthly routine pregnancy examinations were also performed.

The cows that were infused during breeding-rest received 100 mg. of lyophilized-calcium-glucose-terramycin complex* dissolved in 20 cc. of distilled water. An ordinary plastic insemination tube was passed through the cervix utilizing the rectovaginal method and the medication was deposited at the internal os of the cervix. Initially some difficulty was experi-

†The author wishes to thank Dr. R. P. Link, Professor, College of Veterinary Medicine, University of Illinois, Urbana, Illinois, for his generous counsel throughout the experiment.

*The lyophilized-calcium-glucose-terramycin complex used in this experiment was made available through the courtesy of Dr. E. M. Sacchi, of Chas. Pfizer & Co., Terre Haute, Ind.

enced in passing the insemination tube through the cervix during this period of anestrus, but after a little experience the infusions were made rapidly. Shoulder length disposable plastic gloves were used on each cow. A rubber adapter was placed on the external end of the plastic insemination tube and a 20 cc. nylon syringe containing the medication was attached after the tube was in place. The uterus was infused and a physical examination was recorded. The overall time required was approximately five minutes per cow. If no abnormalities were detected in the cow at this time the dairyman was informed that he could breed this cow at any heat period, 60 to 70 days postpartum. If abnormalities were detected at time of examination and infusion, the cow was re-examined at the next monthly examination period. Such cases as severe pyometra, cystic ovaries, retained corpora lutea, and cervicitis, to name a few of the more common disorders that can be diagnosed at this time. The complex of terramycin was used because of greater antimicrobial range, more neutral pH, and slower adsorption than most other antibiotic infusions.

An equal number of control cows were used from each farm at the same time the breeding-rest infusions were performed. There were 37 controls and 37 treated animals that received the breeding-rest infusion.

Results

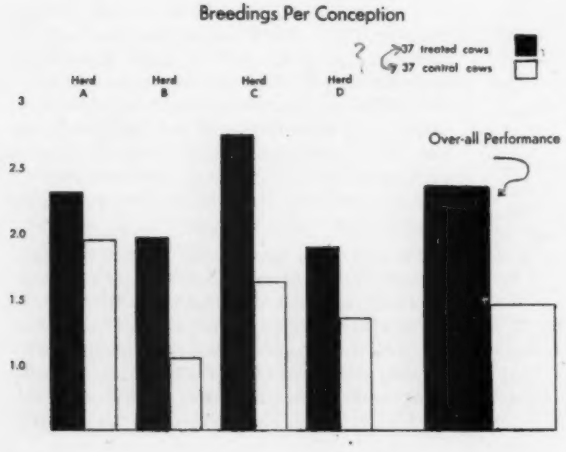
The results of the breeding-rest uterine infusions at the four dairy farms were as follows:

Four cows were removed from this experiment for reasons other than infertility, *i.e.*, poor production records, but these were not included in the 74 animals used. Herds A, B, and C were problem herds for a long period preceeding this experiment, and it may be assumed that after careful operation of a fertility program for an extended period (six to nine months) conception rate could be reduced to the level of herd D. The average conception rate in all herds was reduced from 2.18 to 1.46, or a difference of .72 breedings per cow. Thus, a .72 decrease in breedings per conception may be interpreted as a saving of .72 of a normal estrus cycle, an average of 21 days, or 15.12 days per year based on one calving per year. In the geographical area that this experiment was performed, it cost $1. per day to feed a cow, thus, approximately $15.12 worth of feed was fed to each cow in a year's time for which the cow was not producing, or being milked at the lowest production level. This figure only represents the feed cost, and not the waste in labor which must also be considered.

TABLE 1.

Herd	No. Controls	Breedings Per conception for controls	No. treated	Breedings per conception of treated animals
A	10	2.30	10	1.90
B	10	1.90	10	1.10
C	8	2.75	8	1.62
D	9	1.78	9	1.22
Total	37	Avg. 2.18	37	Avg. 1.46

Statistical analysis was made of the conception rate data in this experiment.[1] Since the purpose of this experiment was to see if treatment improved the conception rate, this data



Graph 1.

represents attribute data and the analysis was made by the method of chi-square.

The treatment definitely improves the conception rate since only 54 breedings were required for 37 conceptions in the group receiving the infusions, whereas 80 breedings were required for 37 conceptions in the untreated group. The treatment was demonstrated to be significantly efficacious with a chance for error of less than two in 100. This is strong evidence for efficacy since a chance for error of five in 100 is normally accepted as significant. The treatment was not affected by whether the breeding method was natural or artificial, since the analysis of this data revealed no significant interaction (method X treatment).

In this study cystic ovaries were revealed in two cows at the time of infusion and subsequently were treated with lutenizing hormone. Both responded to therapy and conceived. It is obvious that if these two cows had not been treated during breeding-rest, three or four heat periods would have passed before the infertility problem would have been brought to the attention of a veterinarian. Five severe pyometritis cases were also treated in this group. If treatment had not been initiated at an early date, many would have progressed to chronic induration and caused permanent sterility, not to mention other complications that could have occurred due to the metritis, notably stress produced ketosis or other metabolic disturbances.

Although it is not within the scope of this paper to discuss the fees for such services, a trial operation of this plan will show that it is profitable to the dairyman and the veterinarian.

Conclusion and Summary

It has been demonstrated in this experiment that routine breeding-rest infusions in all cows decreased breedings per conception thereby reducing dairy operation cost. This experiment has also illustrated benefits of early diagnosis of conditions that cause sterility, and the value of prompt treatment. Routine pregnancy examinations can be conducted in conjunction with the infusions of breeding-rest cows on previously bred cows and heifers to determine and confirm calving dates.

Results of this experiment support the theory that preventive medicine with early diagnoses and efficient medications is the best procedure to follow for both the client and veterinarian. The dairy farmer must be unaware of losses from infertility if he does not take corrective action through preventive planning.

Phenothiazine-Mineral Mixes For Cattle†

GEO. E. CAUTHEN, M.S., D.V.M.
JAMES F. LANDRAM,* B.S., M.S.
Angleton, Texas

Free-choice administration of phenothiazine in mineral to cattle, as a means of controlling the gastrointestinal parasites, has been the goal of parasitologists and cattle raisers since the product came into general use in the sheep raising industry.

Reports[1-5] on the free-choice administration of phenothiazine in minerals to cattle have been both favorable and unfavorable. In some instances unfavorable findings have reflected failure to achieve sufficient consumption.

Results of tests conducted at the station to evaluate low-level phenothiazine in a cow and calf program indicated the need for a more economical mineral mixture. Consumption of phenothiazine by cattle must average 2 gm. daily, and accordingly the mineral mixture intake must be sufficient to insure the proper level.

This report is a summary of findings** achieved by testing the consumption of 51 different mineral mixes. The basic mixes contained approximately 40 to 50% minerals (salt and mineral phosphate compounds), 50 to 60% cottonseed meal, and other substances in small quantities which were added to increase palatability or consumption.

Materials and Methods

Three to eight small local herds of cows and calves were used. Mineral troughs were divided into four compartments to permit testing consumption of four mixes at a time. Consumption records were compiled weekly. Minimum test period was three weeks, however sometimes it ran several months.

†From Texas Substation No. 3, Angleton, Texas. Technical article no. 2671, published with the approval of the director of the Texas Agricultural Experiment Station, College Station.

*Present address is: The Dow Agricultural Research Laboratory, The Dow Chemical Company, Freeport, Texas.

**Progress Report 1813 of the Texas Agricultural Experiment Station contains a detail report of the percentage composition of the 51 mixes.

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Results

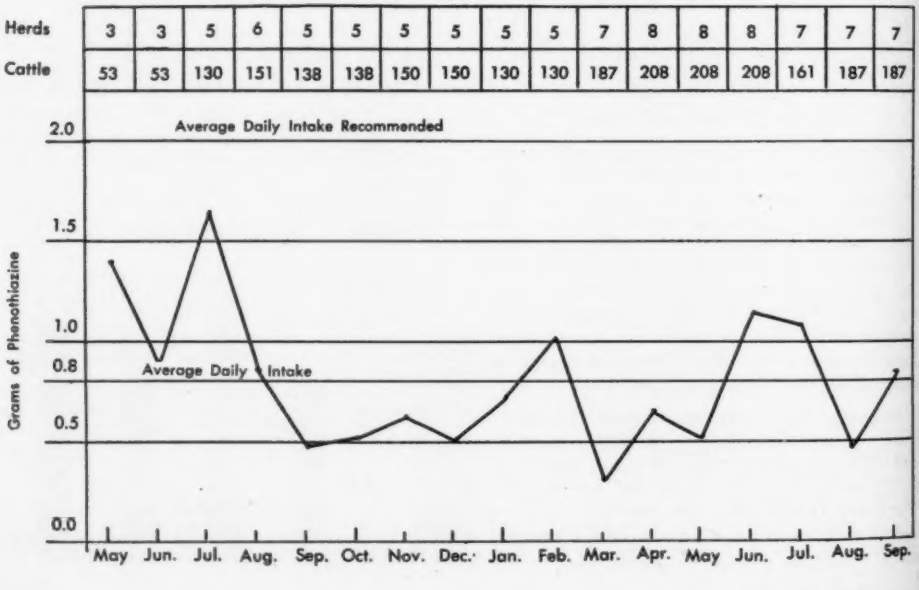
The average daily intake of phenothiazine (calculated on number of adult cattle), the number of herds and adult cattle involved are given in figure 1. The average daily intake in the different herds varied from 0.00 to 3.04 gm., and in the different months from 0.14 to 1.85 gm. The general average was 0.8 gm. daily.

Pelleting of a mix increased consumption, but feed flavors did not. During August through December, cattle preferred mixes containing cottonseed meal to mixes containing ground sorghum grain. During February, March and April, cattle preferred mixes containing ground sorghum grain to those containing cottonseed meal (probably due to the high protein content of the almost exclusive native bur clover pastures). In tests during March and April, mixes with a low percentage of salt (less than 10%) were preferred to those containing higher percentage.

Summary

Cottonseed meal, ground sorghum grain and molasses increased the consumption of mineral mixture containing phenothiazine. However, the mixture containing approximately 2% phenothiazine and 40-50% mineral were not consumed in sufficient amounts (0.8 gm. daily) to give effective control of the gastrointestinal parasites of cattle.

Figure 1.


Herds 3 3 5 6 5 5 5 5 5 5 7 8 8 8 7 7 7
Cattle 53 53 130 151 138 138 150 150 130 130 187 208 208 208 161 187 187
Average Daily Intake Recommended
Average Daily Intake
Grams of Phenothiazine
2.0
1.5
1.0
0.8
0.5
0.0
May Jun. Jul. Aug. Sep. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May Jun. Jul. Aug. Sep.

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3. Report, Chief B.A.I., 1945, page 33.

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Secondary Infections in Influenza Epidemics

A University of Philippines, College of Medicine, Professor, Dr. Angel A. Florentin, reported that based on his study, up to 70% of the population of the Philippine Islands was probably affected during the recent Asian influenza epidemic. Death rate in Manila was more than 16 per 100,000 persons, a far higher mortality rate than has been experienced elsewhere. Secondary infections, Doctor Florentin pointed out, are a major cause of morbidity and death in influenza epidemics. He reported treating a total of 387 cases of proved Asian influenza with terramycin and tetracyn, and found these agents most effective when given within 48 hours of the onset of symptoms. No known drugs appear to have any adverse effect on the virus itself.

Simplified Leptospirosis Diagnosis

ARTHUR FREEMAN,* D.V.M., Kansas City, Missouri

Leptospirosis in livestock has become a steadily increasing problem in the United States since it was first reported in cattle in 1944.[1] In the relatively short time that has elapsed since that first report, there has been a wealth of clinical and experimental data accumulated. Clinical leptospirosis has been difficult to distinguish from certain other diseases even by experienced diagnosticians. For example, one of the most prominent symptoms, abortion, commonly occurs from many other causes.

Since history and clinical signs frequently were not adequate for the veterinary practitioner to make a diagnosis, the need for a dependable laboratory test became obvious. Complement-fixation and agglutination-lysis tests proved to be especially valuable laboratory tools because they could accurately and consistently reveal Leptospira antibodies when present in an animal's blood. But these tests were cumbersome and required too much equipment, time and skill for the busy practitioner.

Realizing the need for a simpler test, workers throughout the country pressed their efforts toward this goal. In 1954, Stoenner at the Rocky Mountain Laboratory, Hamilton, Mont., developed an antigen from killed Leptospira organisms that brought the test to the level of the practitioner's laboratory.[2]

Stoenner's method consists of a plate-screen test utilizing serum agglutination in the presence of antigen to distinguish completely negative serums from those showing any agglutination reaction. Performance of this test is rapid and easy, requiring only a glass plate, a wire loop, and standard dropper supplied with commercial antigen.

However, the screening test is only step one. To determine the significance of an agglutination reaction, one must perform the rapid-plate (titer) test. A titer of 1:40 or less is not considered significant, whereas titers of 1:160 or greater indicate infection was or is present. A second test two weeks later showing an increase in titer indicates active infection, where-

Equipment and technic for serodiagnosis of leptospirosis in animals by the drop method has proved to be reasonably accurate, simple, and rapid.

as a persisting high titer indicates previous infection. Either case is an indication for vaccination.

This test requires pipettes, test tubes, titration skill, and time. Although a comparatively simple test, it is still considered too complicated by many veterinary practitioners.

With these facts in mind, various possibilities were explored and a titer test devised that could be performed on a glass plate almost as simply as the Bang's test. This new technic, designated as the drop method, can be performed with an average time expenditure of less than three minutes per serum sample.

The drop method is merely a variation of Stoenner's method, but requires only a glass plate and standard droppers supplied with commercially prepared antigen as equipment.

Materials and Methods

Equipment: Standard Minnesota testing box, two standard medicine droppers, normal saline solution, *Leptospira pomona* antigen.

Dilution Procedure: Four drops of normal saline solution are placed in a square on the glass plate. To each of three adjacent squares three drops are added.

To the four-drop square (pool no. 1) is added one drop of serum, which is mixed with the dropper after discharging any serum re-

*Professional Service Department, Jensen-Salsbery Laboratories, Inc.

maining in the dropper tube. Mixing is achieved by carefully sucking the mixture into the medicine dropper nozzle and discharging it several times. A certain amount of care in mixing with the dropper is necessary to prevent an excess of air bubbles. The drops, when discharged from the dropper, should be free of bubbles.

From this pool (no. 1) one drop is taken and deposited into the adjacent three-drop pool (no. 2) for further dilution. Another drop from pool no. 1 is placed in the square below. This drop will represent the 1:10 dilution when mixed with one drop of antigen.

Pool no. 2 is mixed with the empty medicine dropper and one drop is added to the next three-drop square (pool no. 3) and one drop to the square below for making the 1:40 dilution.

Pool no. 3 is mixed and one drop added to the next adjacent square (pool no. 4) and another drop from no. 3 is placed on the square below to become the 1:160 dilution.

Pool no. 4 is mixed and a drop placed on the square below to become the 1:640 dilution.

Caution: The antigen dropper should never be used to make serum dilutions because any serum introduced in the antigen will impair its stability.

Making the Test

To the drop of mixture in each square below the respective pools, 1 to 4, is added one drop of antigen. The drop and antigen are mixed with a toothpick or applicator stick starting at the highest dilution (1:640) and working to the lowest (1:10).

After all four antigen and diluted serum mixture drops are mixed, the whole plate is rotated and rocked for one minute to mix thoroughly.

After six minutes read agglutination reaction by box light or flashlight beam. Agglutination under pool no. 1 indicates a titer of 1:10; under pool no. 2, 1:40; pool no. 3, 1:160; and pool no. 4, 1:640.

Results and Discussion

Twenty-five miscellaneous serum samples from cattle and swine showing agglutination in the plate-screen test were tested for titer by the standard Stoenner rapid-plate (titer) test. The same 25 samples were tested independently by the drop method and compared closely with Stoenner's method as indicated in the chart below.

CHART 1. Comparison of Results of Titer Tests (Rapid Plate Method vs. Drop Method)

Identification	Sample no.	Rapid-plate method	Drop method
Stoenner's pooled test serum.	1	442	442
	2	4442	4440
	3	442	442
	4	42	42
	5	42	42
Swine serum screened from herd of 12, Smithville, Mo.	6	4	4
	7	4	4
	8	41	41
Bovine serum screened from two suspected Shorthorns, Platte City, Mo.	9	442	442
Bovine serum screened from 19 Shorthorns, Platte City, Mo.	10	440	440
	11	4440	4440
Swine serum from Platts-burg, Mo.	12	1:2560*	44442
	13	1:640	4442
	14	1:160	4440
	15	1:40	440
Bovine serum screened from 180 miscellaneous cattle, Kansas City, Mo.	16	40	40
	17	40	40
	18	440	440
	19	440	440
	20	4440	4440
	21	440	440
	22	4440	4440
Bovine serum screened from 56 cattle from Gashland, Mo.	23	4440	4440
	24	4440	4440
	25	440	4440

*Degree of agglutination not available on these samples. Dilution of 1:2560 is next greater to 1:640.

Explanation of chart symbols: First digit indicates agglutination at 1:10 dilution, second at 1:40, third at 1:160, and fourth at 1:640, *e.g.*, 442 indicates agglutination at the 1:160 dilution.

Degree of agglutination is indicated from slight to complete by numbers 1, 2, 3 or 4. *e.g.*, 442 indicates complete agglutination at the 1:10 and 1:40 dilutions and partial agglutination at the 1:160 dilution.

In only one case did the titer actually vary, although degree of agglutination varied in the highest titer in four cases.

The test results indicate that the drop method is for practical purposes as accurate as the rapid plate test. Combined with accuracy are

speed, simplicity of technic and minimum requirement of equipment.

Summary

Development of a simplified diagnostic test procedure (designated as the drop method) for leptospirosis *(L.pomona)* based on Stoenner's rapid-plate test is described.

The simplified test provides accuracy and speed, eliminates most of the cumbersome laboratory equipment, and makes leptospirosis serodiagnosis practical for the busy practitioner.

Twenty-five bovine and porcine serum samples were tested by the drop method and compared favorably to the results obtained by the standard rapid-plate test.

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A Baby Pig Disease: Pasteurellosis, Glasser's Disease, Serosal Disease

BERT W. BIERER*, V.M.D, and
CHARLES L. VICKERS,** D.V.M,
Columbia, South Carolina

During 1955, Bierer observed outbreaks of a disease in baby pigs which he called "Pasteurellosis."[1] In his report, however, he acknowledged that Pasteurella microorganisms were not always isloated and indicated that a virus may be associated with the disease that came to his attention. In 1956, Knott reported on Glasser's Disease in Pigs in Queensland.[2] The disease had been observed as early as 1938 and, according to Knott, was due to the bacterium *Haemophilus suis*. During the same year Albert and Mendlowski reported on a Serosal Disease in Wisconsin Swine.[3] These investigators found that the disease was transmissible by either subcutaneous or intraperitoneal inoculation of exudates, and that "the etiologic agent is nonbacterial."

Each of the three separately reported diseases referred to in the foregoing describes a disease of baby pigs characterized on postmortem examination by an inflammation of the pleura, peritoneum, and pericardium, and associated with an arthritis. It appears to be quite likely that these reports of pasteurellosis, Glasser's disease, and serosal disease are the same disease under different names. The "disease" is evidently widespread and of considerable economic importance yet does not appear to be adequately described in existing veterinary textbooks. Runnels, in discussing swine influenza, describes a similar pathology when the swine influenza virus is complicated with a Pasteurella infection.[4] Hutyra, Marek, and Manninger refer to a "fibrinous inflammation of the serous membranes and joints in pigs" but does not supply a specific name for the disease described.[5]

The name Glasser's disease has been used by British veterinarians for a number of decades. In view of this established priority, let's all get together on the terminology and use the name Glasser's disease when the same condition is observed in the United States.

*Laboratory Director, (**Assistant Laboratory Director) Clemson College Livestock Sanitary Department.

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Limitations of Radioisotopes as Therapeutic Agents

Notes from the Society of Nuclear Medicine, indicate that the value of radioisotopes as remedial agents has not met earlier expectations. Other than radioactive iodine and radioactive gold, isotopes have been found to be unpredictable as therapeutic agents, and it has been impossible to control and localize their action. The reports are slightly more encouraging in regard to research conducted on animals with such rare-earth metals as Yttrium 90, Lutecium 177, and Holmium 166, as their action over a 24-hour period indicates greater therapeutic localization. More research is needed for definite information about the entire subject.

PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.

Manhattan, Kansas

Delayed Administration of Antibiotics Recommended in Virus Diseases

Human medical publications are advising physicians not to administer antibiotics during the earlier stages of virus infections. Asian influenza is sometimes mentioned specifically. Reasons are simply that viruses in general are resistant to the action of antibiotics (exceptions noted later in this article). It is contended that in virus infections the body is already waging a battle against the viremia, and if antibiotics are given side-effects of these agents result in the curtailment of the more or less normal organisms located in organs and orifice of the body. Thus the body must fight the viremia without the aid of the normal organisms. It is admitted that antibiotics are effective against large particle viruses such as those of trachoma and psittacosis. In regard to the latter, a rather extensive outbreak of psittacosis in an aviary in Mississippi would have resulted in an order from local health authorities to destroy this valuable breeding flock of parrakeets to prevent its possible spread to persons having contact with them. Intramuscular injections of an antibiotic were approved on the basis of their effectiveness. Steps in the handling of the condition consisted in the destruction of baby parakeets; then the remaining mature birds were given intramuscular injections, usually two or three at three day intervals (0.1 cc. of aureomycin-sesame oil preparation) for the two injection treatment, or for the three injection treatment dosage used was 2.5, 2.5 and 5 mg. respectively. Treated birds were then moved to sanitized quarters. Thirty days after treatment 4% of the flock, selected at random, were submitted to a laboratory for virus isolation studies, and were shown to be negative by individual tests. Since veterinarians are called upon frequently to treat virus infections in animals it is well to bear in mind that all viruses, with the exception of those having relatively large particle size, are resistant to the action of known antibiotics. The use of the agent during the early stages may be decidedly detrimental. (In the three-day treatment of parakeets referred to, third injection was made 11 days after the second.)

"Bagging Up" Dairy Cows for Show

Cattle of the dairy type exhibited during these fall months at county and state fairs frequently are brought into the show ring with heavily distended udders as a result of discontinuing temporarily, withdrawal of milk so as to impress the judges in placing the animals. This "bagging up", as dairymen name it, may in some cases, especially in animals that are normally heavy milkers, cause acute mastitis so that the animal goes off its feed exhibiting symptoms, closely related to those of infectious mastitis.

Veterinarians know that normally secretion of milk in the udder is in direct proportion to the animal's blood pressure. This means that the total of milk secreted is greatest when the udder is kept most continuously in a flaccid state, or conversely, as a result of bagging up total secretion is reduced. Veterinarians in general advise against the practice especially during times of heavy milk secretion.

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Tranquilizers in Wide Use

The group of medicaments generally spoken of as tranquilizers appear to be meeting with increased favor by small animal practitioners for the purpose of relieving stress in their patients. These agents have a decided advantage in that proper dosages do not materially affect the various physiological processes of the animal body. Also in small animals they can be withheld at the discretion of the practitioner, though in human subjects self dosing, largely because of the almost dramatic effect of the agent, harmful effects have been recorded.

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An old-time practitioner told us during our mutual attendance at a veterinary conference that he is still practicing udder insufflation in the treatment of postpartum paresis in dairy cows using carefully filtered air. He claimed quick recovery with only a rare relapse; in which event he uses small intravenous doses of calcium gluconate.

VETERINARY PARASITOLOGY

A. O. FOSTER, B.A., M.A., Sc.D.

Beltsville, Maryland

Injuriousness of Sheep Tapeworms; Toxicity of Lead Arsenate

A report from New Zealand[1] reopens the question of tapeworm injuriousness to lambs. Little has been said on this subject since the review and critical experiments of Kates and Goldberg,[2] who found no evidence that tapeworms are *per se* injurious. According to the report in question, however, enterotoxemia of *Clostridium welchii* type D toxin caused mortalities that commonly exceeded 10% in a district where the condition was formerly unknown, and the disease was regarded as probably secondary to heavy infestations with *Moniezia expansa*. Significance was attached to the likely primary role of tapeworms in retarding normal bowel activity. The losses, moreover, occurred under conditions not commonly associated with uncomplicated enterotoxemia.

Although the anthelmintic removal of tapeworms alleviated the condition, vaccination was logically regarded as the only efficient prophylaxis.

The report included some practical observations on ovine teniacides, notably, copper-nicotine drench and lead arsenate. The former was thought to be sufficiently effective for practical purposes, cheap, and reasonably safe. The experience with lead arsenate was especially disturbing, since toxic effects of unprecedented severity were reported. Three of five treated lambs died, despite use of recommended doses. Liver analysis showed amounts of lead and arsenic that were "consistent with lead arsenate poisoning." Conceivably, the compound was not the same as that commonly used as a teniacide or conditions may have favored excessive absorption, but, whatever the explanation, results must be carefully considered in view of the comparatively extensive use of lead arsenate as a ruminant teniacide in this country as well as abroad.

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A Practical Aspect of "Self-cure" in Sheep?

Recent studies in Australia[3] augur the inviting prospect of controlling gastrointestinal parasites by immunological technics. Since 1929, when Stoll published his classical study on the immunity of sheep to *Haemonchus controtus*,[4] the phenomenon of "self-cure" (the term coined by Stoll) has been the subject of investigation and conjecture. Indeed, it was Stoll's thought that sheep might ordinarily do well if left with their worms,[4] but the hazard of heavy losses among lambs prevented reliance on this hypothesis.

The Australians, however, have brought the immunity reaction into new focus, giving it a practical significance, by showing that parasites are expelled from hypersensitized sheep when such animals are given massive doses of infective larvae. The reaction, moreover, is not specific, since the administration of *H. contortus* larvae appears to "cure" not only Haemonchus infections but also those of *Trichostrongylus axei*, *T. colubriformis*, and *Ostertagia circumcincta*. However, larvae of *T. colubriformis* may not provoke a like reaction against *H. controtus*. "The effect of the intake of larvae of one species of nematode upon existing infestations with other species appears to depend upon their respective location in the alimentary tract, and again suggests a local rather than a systemic reaction. Antigenic material from larvae in the abomasum could pass readily to the small intestine, whereas similar material from the small intestine could not pass readily to the abomasum."

When one considers that many, if not most, farm sheep are probably rendered hypersentitive to the aforementioned parasites at an early age, the potential significance of the Australian studies can not be regarded lightly. However, until there is confirmation and practical evaluation, we must continue to rely primarily on chemical and management measures for parasite control.

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POULTRY PRACTICE PROBLEMS

W. R. HINSHAW, D.V.M., Ph.D.
Frederick, Maryland

Temporary Singers

Female canaries which sing for temporary periods have been reported by pet-bird dealers according to Herrick and Harris (*Science*, 125:1299, June 1957). To determine if male sex hormones would induce non-singing females to sing, they injected five young but fully grown females with 0.1 ml. each of microcrystalline suspension of male sex hormone (testosterone phenylacetate-perandren,® Ciba). Four birds were left untreated. Nine days after injection, two of the treated canaries made a series of chirps, and 12 days after treatment all were singing. The songs, however, lasted for only a few seconds at a time. As time lapsed the songs became indistinguishable from those of young males. Vigorous singing continued for nearly a month, after which there was a gradual decrease until after five weeks all treated birds stopped singing. No untreated bird was heard to sing. A second round of treatment caused the birds to again become temporary singers.

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Old Hens Not Profitable

It is not profitable to keep hens over the second year is an old adage restated for emphasis recently by Boyd Bonzer, South Dakota extension poultryman (*Am. Hatcherman*, May 1957). He reminds his clients that old hens generally lay 20 to 30% fewer eggs than they did the first year, and eat about a third more feed than pullets, for each dozen eggs they lay. Furthermore, old hens do not produce top quality eggs after they reach 18 months of age. They are also apt to be carriers to transmit diseases such as tuberculosis, fowl cholera, chronic respiratory disease, and other respiratory diseases to susceptible pullets.

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Figures from the Seventh California Official Random Sample Laying Test revealed that light breeds of pullets required 123 lb. of feed on a hen-day basis to raise them as replacement pullets through a year of production until 18½ months of age. The heavy breeds and crossbreeds required slightly over 131 lb.

Grit for Poultry

There have been many opinions expressed in recent years on the real benefits of grit for poultry. Much of the controversy has been over the use of soluble *vs* insoluble grit. Scott and Heuser of Cornell University (*Poultry Tribune*, Apr. 1957) state that research work by them indicates that insoluble grit, either granite or feldspar, improved growth, egg production and feed efficiency when fed to chickens and turkeys receiving mash and grains.

Additional results from their experiments indicate that:

1. Crushed limestone grit (calcite) and crushed oyster shell are of little value in aiding the gizzard in its grinding process.
2. Growing chicks may overeat calcium grits when the diet is already adequate in calcium and when no insoluble grit is fed.
3. In growing turkeys receiving mash and grain, supplemental calcium may be needed for maximum bone calcification and the prevention of leg weakness.
4. Granite grit and feldspar were consumed equally well when fed alone, but chicks, turkeys, and laying hens all preferred feldspar grit to granite grit when given the opportunity to choose between them.

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Ready to Cook Turkey

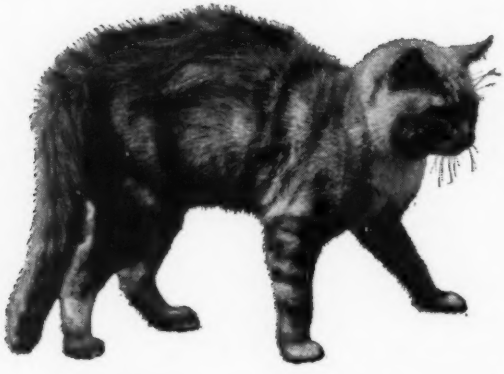
The total output of turkey meat in ready-to-cook weights has increased from 288,000,000 lb. in the 1935-39 period to more than 1,000,000,000 lb. in 1957, (*Poultryman*, Aug. 30, 1957). These figures are reported by a USDA study of the growth of the turkey industry during the past 20 years. Per capita consumption has risen from 2.2 lb. in the 1935-39 period to approximately 6 lb. now. During the same period the eviscerated or ready-cook turkey carcass has all but replaced the New York dressed style. Present day consumer demand for turkeys can be attributed to a number of factors, but the general evisceration program, improved processing and packaging have played important roles. One only has to visit the modern retail market to observe the marked changes that have been made in merchandizing of turkeys.

Small Animal

SECTION

THERAPEUTICS • MEDICINE • SURGERY

IT IS ONE THING TO "DRUG" ANIMALS . . .



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P
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Pharmacy Management: Buying and Inventory Control†

ROBERT P. KNOWLES, D.V.M., Miami, Florida

ECONOMIC aspects of pharmacy management are frequently overlooked by veterinary practitioners. Lack of application of basic buying procedures continue to prove costly in even the most successful practice. Almost all small animal hospitals have experienced overbuying of an item because of discount enticements, and underbuying because of inadequate information on use trends. Neither of these can be considered a pleasant experience. Analyzed in retrospect, it may be concluded that although intelligent buying is somewhat of art, basic guide principles are available to give a scientific aspect to both buying and pharmacy management.

Methods employed by pharmacists are consistent, and principles applied in that profession are almost universally accepted. Pharmacists have developed a system which makes it possible to know cost, selling price, and quantity on hand of a myriad of drug products at any time. Planned buying and inventory control assure not only accuracy but profit in operation. Some essential facts regarding these methods are presented here with modifications to fit the needs of a veterinary practice. This problem and its importance economically was identified by a trained hospital administrator, who promptly pointed out the extra number of animals that have to be treated each year in order to compensate for losses incurred by inadequate drug inventory management.

†Presented at the 24th annual meeting of the American Animal Hospital Association, San Francisco, Calif., May 8-11, 1957.

Proper Pharmacy Control is Money in Your Pocket

A large proportion of the cash outlay carried as inventory in the modern small animal hospital is represented by drugs. Since important sums of money are involved, it is possible to dissipate capital at a surprising rate if careless or unwise methods of pharmacy control are used. It is not the purpose of this paper to discuss the relative merits of dispensing versus prescription writing. Both have a place in small animal practice. However, it must be noted that a properly conducted dispensing business can be carried on with no loss of dignity, and at a profit.

Drug purchases should be predicated on quality, price, and quantity used. Anyone who purchases drugs has been bombarded with the fact that large quantity purchases result in price reductions. It is, however, an uncomfortable turn of events to find that advantages gained in quantity discounts are lost when the price drops far below the bargain price paid for a drug, or it has been replaced by a better product.

Buying Objectives

The method of pharmacy control which we practice and which I am recommending to you has seven worth while objects.

1. To maintain a constant stock level based on consumption. This results in a reduction of stock levels to a minimum without the danger of "running out." Spoilage and outdating

are minimized. Breakage and loss of articles are reduced. A review of usage records before ordering prevents unprofitable large scale purchases.

2. To avoid duplication of orders and drugs. By this method it is possible to effect a standardization of all drugs consumed in the practice. This is particularly important in a practice in which more than one veterinarian is involved.

3. To maintain a constant cost price comparison. Any increases in cost are immediately evident. Only by such a cost price comparison can really profitable utilization of quantity buying be accomplished.

4. To establish a realistic price. The prime purpose of dispensing must be to assure our client an adequate supply of the drug we wish our patient to have at a reasonable profit to ourselves. In order to accomplish this purpose, it is necessary to have the dispensing price based on the cost price, and changes in cost must be reflected in changes in the dispensing price in order for a profit to result. For those of you who are statistically minded, from the figures accumulated on drug consumption and price it is possible to tabulate the relative ratio of the drug consumption as compared to the total volume of business.

5. To maintain an automatic running inventory. Because of this automatic inventory an accurate appraisal of drug inventory for tax or other purposes is readily available.

6. To streamline pharmacy operation. Since bulk ordering is practiced, much of the time spent in daily ordering is eliminated. This establishes responsibility for the drug inventory and drug ordering. Drugs are kept in alphabetical rather than therapeutic order. There is less confusion about where a new article should be placed, and it can much more easily be added to the stock. Reordering any drug in short stock with a minimum of time is facilitated. The veterinarian is charged with the responsibility for remembering the specific name of the article and nonprofessional assistants, including secretaries, who might be involved with drug dispensing are not required to remember names or therapeutic indications.

7. Dead item usage. This inventory control as outlined will point up vividly drugs that have no reduction in inventory for several months. From the monthly inventory, a list should be made of items that need to be used up. By concentrating on these products, they can be used in clinic and hospital practice, and make room for items which may have more appeal to the veterinarian or to the client.

Recommended Methods

1. All drugs are kept in alphabetical order on the shelf.

2. An inventory control card (fig. 1) contains the name of the article or product, the size, form (vial, tablet or capsule, et cetera), and the manufacturer. We have found it also convenient to number the cards under each alphabetical heading to facilitate reinsertion in the relative position on the shelf. The card also contains the date, the initial (in our hospital where there are four veterinarians it is necessary for someone to assume responsibility, and any change should reflect the man who made the change), and it should show the quantity on hand, the quantity that has been ordered, the date and quantity received, the source of the product, the cost price, and (if it is a dispensing item) the selling price.

3. A separate inventory control card is made out on each item. Stock levels are arbitrarily set on every item in the pharmacy. Monthly inventory counts will show the consumption of every item in the pharmacy and after a sufficient period, seasonal trends in consumption can be accurately predicted. Stock levels should be adjusted according to the use record.

4. There are regular inventory counts and purchase periods. For example, it is good business to put your order in at the first of the month, buy your month supply ahead of time, and utilize the drugs without an outlay of money for a period of 40 days, and still enjoy the 2% discount that is customary for cash purchases.

5. Drug orders are made by someone assigned to this duty in the front office but only from written purchase orders signed by the veterinarian. This again is a more important factor in a hospital where several veterinarians are practicing together.

6. A want book should be available in the pharmacy for immediate inscription of any item which is desired by any of those operating out of this pharmacy. This may be a new drug, information on which has just become available. Or it may be a drug which someone believes to be out of stock, but which has not been checked accurately. Want items should be picked up daily and checked for accuracy before the ordering process is started.

Helpful Hints for Happy Harvest

The following facts and philosophies have for the most part been sifted from books written by accountants and sales executives and directed toward the retail drug store. The

INVENTORY CONTROL

ITEM:

Date	Stock Level	By Initial	On Hand	Quantity Ordered	Date	Quantity Received	Source	Cost	Selling Price

business management of a veterinary pharmacy closely approaches that required for a successful management of a retail drug store. Although the aims are certainly not the same, they operate on the same law of supply and demand and on the same margin of profit or loss.

1. You should never buy less than the quantity you will need for the period of credit extension and in-transit delivery. In other words, if you pay for your merchandise on a monthly basis you should never buy less than a month supply of anything.

2. In a recently conducted survey it was shown that the profit (of a drug store) was nearly twice as much from buying from a wholesaler rather than direct from the manufacturer. This difference in profit was largely made up by a lesser quantity which was required when purchasing from the wholesaler and a consequent more frequent turnover of the product.

3. Here are four habits of good buying:

(a) Take advantage of all available discounts by prompt payment.

(b) Maintain a turnover in each commodity which is essential to prevent loss through deterioration.

(c) Items of little use should never be bought in quantity regardless of the price inducements offered.

(d) Base orders on your requirements as indicated by past experience.

Out of Stock

When a buyer is out of stock three major things happen:

(1) Business is lost. We have the alternative of writing a prescription but there is always an embarrassing silence which ensues when the veterinarian has announced to his client, "I am going to give you some tablets to take home for you to give your dog," and his fumbling discovery that there are no such tablets available on his shelf and that he is going to be compelled, as an afterthought, to write a prescription. Many clients seem to resent the additional time that is required for them to make the extra stop at the drug store.

(2) There is always extra work involved with a rush order. In our case, perhaps, it entails sending an assistant all the way across town to borrow a bottle of serum or vaccine from one of our colleagues.

(3) Transportation costs are usually increased. It is customary to send a telegram and ask for a rush order to be shipped air mail. All of this decreases the profit potential of pharmacy operation.

Surplus Stock

When a buyer has surplus stock, again three major things happen:

(1) Surplus stock means a greater dollar investment, and with most veterinary hospitals these dollars could, perhaps, better be used on new equipment or better maintenance of the building.

(2) Surplus stock occupies space which costs money. It costs money to keep the shelves clean or it costs additional money if they are not kept clean. In many localities tax collectors are keen enough to note much of an increase in your drug inventory. Insurance rates may also be affected.

(3) Where there is surplus stock, time is always a big factor. Products are more likely to become damaged or supplanted by a better product.

Summary and Conclusion

It might appear, at this point, that I have been digging rather strongly at quantity purchases. This actually is not the case. There are

increased profits to be made from wise quantity purchasing, but the fact that a veterinarian can, and does, buy any particular product in a quantity greater than is required to meet his immediate need does not necessarily result in increased profit.

In order to be a profit-wise investment, a quantity purchase must meet these three criteria:

1. It must be the best use for the money available.

2. There should be reasonable assurance that no price decline will affect this particular product during the interval required to consume the product in the practice.

3. There should be reasonable assurance that no superior product will replace it, and, that it is not subject to breakage or deterioration.

One word of caution should be added. The mere establishment of this inventory system does not provide the answer to proper pharmacy management. In order to function, as in every other phase of hospital operation, this method of pharmacy control must be maintained by punctual and careful attention to details.

By this method the feast and famine of drug supply can be avoided. It will encourage limiting drug stock, point out drugs which need to be used up in the hospital practice, and drugs which are no longer desirable to stock. It will avoid outdating, misuse and disuse, and if the dispensed items are realistically priced, will result in increased profits from this neglected hospital department.

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World Seminar on Veterinary Public Health

The World Health Organization (WHO) is sponsoring a Seminar on Veterinary Public Health in Warsaw, Poland, November 25-December 4, 1957. This program has been especially developed at the request of the European Office of the WHO and by eastern European countries which are members of the WHO. Dr. Erik Holager, Public Health Veterinary Consultant, European Office, and Dr. Martin Kaplan, chief of the Veterinary Public Health Section, WHO have been quite active in developing the program. The program will cover a multitude of items of interest to veterinary, medical, and public health officials.

At the opening session of the meeting, the Inter-relationship of Human and Animal Health and Disease will be discussed by Dr. James H. Steele, Veterinary Director, U. S. Public Health Service, followed by an address on the Ecology of Zoonoses by Dr. E. N. Pavlovsky, the Russian academician and zoologist who has developed a theory on the geography of disease. Doctor Pavlovsky has been active in this field for more than 50 years. Following the opening session, the control of food and products of animal origin in the transmission of diseases will be discussed by Dr. C. Cockburn of Great Britain, Dr. A. Jepsen of Denmark and Dr. Erik Holager of Norway. A number of sessions will be devoted to veterinary public health practices. Among the speakers at these sessions will be Dr. Joseph Parnas who is in charge of the Polish Institute of Occupational Medicine and Rural Hygiene at Lublin. Doctor Parnas has written extensively on the epidemiology of animal-borne diseases and their effect on rural populations.

Dr. Martin Kaplan will discuss the reporting of zoonoses and their control. Dr. R. Vuillaume, veterinary director general of France, will discuss training of personnel both at the undergraduate and postgraduate level. Doctor Vuillaume was formerly a professor at the Alfort School of Veterinary Medicine near Paris before becoming veterinary director general.

Dr. D. Studic of Yugoslavia who recently visited the United States will present a lecture on collaboration between medical, veterinary sanitary and allied disciplines. Doctor Studic is a Public Health Veterinarian with the Federal Public Health Service, Office of Epidemiology, Belgrade, Yugoslavia.

During the second week of the conference, Dr. D. Blaskovic, director, Institute of Virology, Czechoslovakian Academy of Sciences, Bratislava, Czechoslovakia, will lead a discussion on tick-borne encephalitis in eastern Europe.

Dr. B. Babudieri of Italy who is well known in the United States will be the speaker on leptospirosis. Toxoplasmosis will be reviewed by Dr. C. Siim, chief, Toxoplasma Laboratory, Copenhagen, Denmark. The presentation on dermatophytosis will be given by Dr. C. J. La Touche the eminent mycologist of Leeds, England. Other sessions will be devoted to brucellosis, rabies, and tuberculosis. These will be led by Dr. Martin Kaplan. During the sessions and following the meeting visits will be made to Polish veterinary public health institutes. These are located in Warsaw and Lublin.—*James H. Steele, D.V.M., M.P.H.*

Mepazine † In The Treatment Of Canine Chorea

JANE FRANCES EMELE,* Ph.D.; ROBERT L. MULFORD,* B.S.;
CHARLES C. SCOTT,* M.D., Ph.D., Morris Plains, New Jersey

CANINE chorea is one of the most frustrating syndromes confronting veterinarians today. This condition is a common sequel to acute infectious diseases, especially distemper. There is no indication that sex, breed or lineage of the animal is a determinant. The prognosis of life span is excellent, but for the syndrome itself is very poor. The possibility of spontaneous remission is quite remote.

Chorea is characterized by chronic, involuntary, persistent clonic spasms or twitchings of a specific muscle or muscle groups. The head and anterior limbs are most commonly affected; but involvement of the pelvic girdle and hind limbs occurs quite frequently. Least commonly the masseter muscles exhibit this phenomenon, resulting in continuous spasmodic movement of the jaws. Those areas affected may be singular or in any combination. The severity and periodicity of the tremors vary according to the particular muscle groups involved and to the individual dog.

The muscular contractions are commonly gross in character and can be easily observed during any physiological state. In some cases the movements are only discernible when the animal is resting and the postural tone of the musculature is relaxed so that contraction is not prevented by opposing muscle groups. It is not uncommon for the muscular contractions to be so fine in nature that they are not easily seen but must be felt.

In moderate to severe cases, interference with the normal gait of the animal may exist. Other than this there is no impairment of consciousness or learning ability. Pulse rate and temperature are in the normal range and appetite is not often affected. Neurological examination reveals no abnormal reflexes.

Present therapy[2] employed in canine chorea includes the use of parsidol® (Warner-Chilcott Laboratories)[3] and rutol® (Pitman-Moore Company).[4] These drugs have been found helpful in the control of certain cases of chorea, but there is need for superior therapy. These studies were initiated to determine the status of mepazine (paxital)® in this area.

Procedure

Three adult mongrel dogs, one female and two males, weighing from 15 to 31 lb., were used in this study. The following is a description of the choreic activity of each dog.

Dog 1, female, wt. 15½ lb. This animal had constant flexion of the left hind leg. The tremor, which involved the flexor muscles of the thigh, leg, and paw, occurred approximately 30 times per minute. The tremor was gross and could easily be observed regardless of the animal's position. Gait was not markedly affected, but the dog did have considerable difficulty in changing from a sitting to a standing position. The tremor did not appear to increase in severity when the dog was resting and unknowingly was being observed.

Dog 2, male, 30 lb. This dog had a mild tremor of the left hind leg involving the flexor muscles of the thigh and leg. The tremor was fine, but was easily discernible when the dog was sitting or lying down. No apparent difficulty in walking or running was noted.

Dog 3, male, 30 lb. This dog suffered a severe case of chorea. Tremors involved the entire front quarters, shoulder girdle, and head. There was involuntary, persistent nodding of the head in concert with an up and down bobbing movement of the shoulder girdle and bending of both front knees. This dog experienced considerable difficulty in walking and was unable to jump in and out of the cage. Periodic loss of balance would result in a sudden fall. Tremors were just as severe when the dog was sleeping as when alert. As a consequence of this condition and lack of appetite, the animal exhibited extreme emaciation.

All three dogs were observed by two well-trained observers daily for three weeks prior to administration of the drug. All forms of activity were analyzed; that is, walking, running, jumping in and out of cages, and resting. Every manifestation of their condition, be-

†Mepazine [10-(1-methyl-3-piperidymethyl)-phenothiazine] Paxital-Warner-Lambert Pharmaceutical Company, Morris Plains, N. J.

*Department of Pharmacology, Warner-Chilcott Laboratories, Division of Warner-Lambert Pharmaceutical Co., Morris Plains, N. J.

havior and tremors, was noted critically. After administration of the drug the dogs were again routinely observed by the same observers.

For the test, the hydrochloride salt of mepazine was employed. Capsules of the salt were presented to each dog in a small meatball. Three doses of 25 mg./kg. each, were given to each of the three dogs. Two doses were given, one in the morning and one in the afternoon, in one day; and the third dose was given in the morning of the following day.

The effect of mepazine on the choreic activity was compared to that of trihexyphenidyl, 5 mg./kg., orally; ethopropazine, 20 mg./kg., orally; meprobamate, 5 mg./kg., intravenously; and chlorpromazine, 1 mg./kg., intravenously.

Results

One hour following the administration of the second dose of mepazine complete abolition of the tremors of dogs 1 and 2 occurred; in dog 3, nodding of the head had completely stopped and the shaking of the shoulder girdle and legs was more than 75% inhibited. There was no indication of sedation or toxicity. Since the date of drug administration, May 28, 1957, two of the dogs (1 and 2) are completely without tremors, and the third is so improved that appetite is normal and the animal has gained weight. All of the dogs walk and run without difficulty and dog 3 can now jump in and out of the cage with ease. Duration of this effect has been four months to date.

In contrast to the action of mepazine, chlorpromazine produced accentuation of the tremors concurrent with tachycardia and marked sedation. Ethopropazine had no effect. Trihexyphenidyl and meprobamate were relatively ineffective; the tremors were only mildly inhibited and then for a brief duration.

Discussion

It is thus obvious that mepazine was extremely effective in the treatment of these three cases of canine chorea. It produced partial to complete abolition of tremors, affecting gross and fine tremors equally. Secondary to the effect on the tremors, the agent appeared to improve the appetite and general well being. An additional advantage is that it can be given orally, even incorporated in the diet.

It will be of interest to extend the use of mepazine to additional cases of canine chorea to learn how consistent is the action of the drug in this disease.

Previous studies[3] have shown that mepazine is well tolerated by dogs. Daily administration of 100 mg./kg., orally, for six months has had no deleterious effects. The dose used in the current study, therefore, may be considered completely safe.

At the present time we can not state the average minimum effective dose. It may be less than that employed in this study. Undoubtedly, the degree of pharmacological effect to be derived in chorea will be determined, not necessarily by the severity of the case, but by the muscular and/or neurological involvement. Successful therapy may entail a series of successive doses at perhaps weekly intervals until remission of choreic activity.

The mechanism of action of mepazine in chorea is as yet obscure. There is no doubt that a linear relationship does not exist between the duration of drug action and the presence of the drug in tissues. In fact, mepazine disappears quite rapidly from the circulatory system, so that the continued improvement of these dogs can not have been dependent on continued blood levels. This is in sharp contrast to other drugs known to have an effect on chorea.

It is known that mepazine is depressant to cortical and specific subcortical areas.[1] Perhaps for the favorable effect in the cases reported. The fact that animals retain or regain their normal voluntary control and coordination could indicate a peripheral site of action, perhaps at the myoneural junction. Studies are in progress in these laboratories to further elucidate the mechanism of action of the therapeutic agent.

Summary

Mepazine in a dose of 25 mg./kg. for three doses at 12-hour intervals caused complete or nearly complete suppression of canine chorea for at least four months duration in three affected dogs. The full duration of effect has not yet been determined, so that a possible "curative" effect may have resulted. This effect was not observed with other drugs studied in this series.

Acknowledgments

The authors gratefully thank Dr. Robert Gardier of Pitman-Moore Company for supplying dogs employed in this study.

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The therapeutic benefits formerly attributed to treatment with the iodides have fallen into disrepute in recent years due to lack of conclusive proof of the activity of this ion.

This work clearly demonstrates that the iodide ion effectively suppresses the growth of granulomatous tissue and the volume of fluid exudate in the granuloma pouch, and because of this activity must be classified as a primary source of anti-inflammatory activity.

Studies On The Mechanism Of Iodide Activity†

A. R. HASKELL, B.S., M.S., Ph.D., and ROSE ADJARIAN, B.S., M.S.,
Kansas City, Missouri

ADMINISTRATION of iodine and iodides at the nutritional level for support of the thyroid function has been extensively studied, and the role of the iodide ion in this respect has been clarified.[1,2]

Unfortunately laboratory confirmation of the activity of iodides in the therapy of inflammations and granulomatous lesions has been lacking. Goodman and Gilman in their discussion of iodides state that these compounds have an action on syphilitic lesions and others "the nature of which remains obscure."[3]

Recent experiments have demonstrated that 250 mg./kg. cuprous iodide administered orally will suppress the development of the granuloma pouch in the white rat.[4] Correlation of this observation with the clinical response noted in therapy with iodides has suggested that activity probably lies in the anion and therefore represents proof of the activity of iodide.

This report summarizes a study of the activity of the iodide ion on the granuloma pouch and an investigation into the effect of adrenalectomy on the result.

Experimental Procedure

All animals used in this investigation were female albino rats weighing 150 gm. All laboratory rats were obtained from National Laboratory Animal Supply Co., Creve Coeur, Mo. The animals were maintained on Purina Laboratory chow and water *ad. lib.* Adrenalectomy was performed under ether anesthesia using the lumbar approach, and the animals were maintained on Purina Laboratory chow plus 2% sodium chloride in the drinking water following surgery. One week was allowed for recovery before further experimental work was attempted.

The granuloma pouch is formed following Selye's[5] technic, by injecting 25 cc. of air subcutaneously on the dorsum of the rat through a 26 gauge, 1½ inch needle. By changing syringes, 1 cc. of 1% croton oil in corn oil is then injected into the lumen of the pouch through the same needle. The needle is then removed and the skin pinched to prevent escape of the air.

The pouches were allowed to develop for 12 days. Next the pouch fluid contents were measured in a graduated cylinder. Following preservation in 4% formaldehyde and removal of excess water by rolling in absorbent paper, the weight of granuloma tissue was determined on a torsion balance.

In one series the activity of potassium iodide on the pouch was studied in an attempt to learn whether the effect of cuprous iodide was actually a function of the iodide ion. Potassium iodide, 100 mg./kg., was injected subcutaneously six days a week for the 12 days of the test, one weekend intervening. To determine the effect of the injection *per se*, a second group was injected in a similar manner with distilled water. The third group of this series served as untreated controls.

To assess the possibility of iodide activity via the adrenal gland, the following experiment was conducted on adrenalectomized rats. One group of ten rats each received cortisone ace-

†Department of Experimental Medicine, Jensen-Salsbery Laboratories, Inc.

A study of known effects from the administration of iodides, and correlation of these effects with certain results of corticosteroid therapy, made it seem likely that the iodides would demonstrate anti-inflammatory activity in the granuloma pouch. This suspicion was strengthened by the observation that cuprous iodide, administered orally, suppressed the development of moist skin lesions in the dog.

tate subcutaneously, 1 mg. daily, for the 12-day test period. The second group received sodium iodide, 100 mg./kg. daily, by the same route. The control animals received no treatment other than sodium chloride in the drinking water.

As a measure of the effective dosage range of the two compounds, cuprous iodide and potassium iodide, these substances were administered to groups of ten rats each in doses of 25, 50, and 75 mg./kg. of iodide ion daily. Both compounds were injected orally via a gastric tube, the potassium iodide dissolved in distilled water, and the cuprous iodide suspended in 2% acacia. To permit holding the animal without damage to the pouch, each rat was lightly anesthetized with ether before insertion of the gastric tube. Control rats were treated in an identical manner and a comparable volume of distilled water was administered daily.

Standard errors in all groups were calculated in the usual manner and the significance of difference between groups was determined using the "t" test.

TABLE 1. Fluid Volume and Tissue Weight of Granuloma Pouch with Various Treatments

Group	Treatment	No. rats	Fluid volume* cc.	Tissue weight* gm.
1	Untreated controls	10	16.5 ± 3.14	2.02 ± .20
2	Distilled H_2O subcutaneously daily injection .1 cc.	10	10.4 ± 2	2.08 ± .22
3	KI 100 mg./kg. subcutaneously daily injections	10	2.3 ± .91**	1.05 ± .01***

*Mean ± standard error — S.E. $= \sqrt{\Sigma \frac{(x-\bar{x})^2}{n(n-1)}}$

**Significantly lower than uninjected control value ($p<0.01$) and water injected control value ($p>0.01$)

***Significantly lower than untreated control value ($p<0.01$) and water injected control value ($p>0.01$)

Results and Discussion

Treatment of the group of animals with 100 mg./kg. potassium iodide daily resulted in a highly significant decrease in both the volume of fluid in the pouch and the weight of tissue in the granuloma wall. The mechanical effect of the injection of distilled water also caused a decrease in both volume of fluid and weight of granuloma tissue, but the decrease was not as pronounced. Comparison of the values for the water treated group with those of the potassium iodide treated group demonstrates again a significant decrease in animals receiving iodide. Calculations with their standard errors are shown in table 1. From these data and previous work demonstrating the activity of cuprous iodide,[4] it may be concluded that the iodide ion effectively suppresses development of the granuloma pouch.

Data derived from the treatment of the granuloma pouch with sodium iodide and cortisone acetate are presented in table 2. It may be noted that sodium iodide, 100 mg./kg. daily, reduced the volume of fluid in the pouch and the weight of tissue in the granuloma to the same extent as 1 mg. daily of cortisone acetate ($p>0.05$). The iodide ion therefore acts as an anti-inflammatory agent by direct activity on the tissues and not by activation of the pituitary-adrenal axis.

Results from the administration of iodide in various doses, and from two sources, are presented in table 3. The fluid volume column will show that, in general, as the dose of iodide increased from either potassium iodide or cuprous iodide, the average fluid volume in the pouch decreased. There is at present no apparent explanation for the deviation found in group 3 in which the fluid volume did not follow the expected pattern established by other potassium iodide treated groups (groups 2 and 4).

Again it will be noted that the fluid exudate values for the potassium compound are higher at each level of iodide administration than the comparable values for the copper compound. Although the values do not differ significantly, as demonstrated by the "t" test ($p>0.05$),

TABLE 2. Fluid Volume and Tissue Weight of Granuloma Pouch with Various Treatments in Adrenalectomized Rats

Group	Treatment	No. rats	Fluid volume† cc.	Tissue weight† gm.
1	Untreated controls	9	14.8 ± 2.3	2.12 ± .23
2	Cortisone acetate 1.0 mg. subcutaneous daily injection	9	3.4 ± 1.3	.92 ± .16
3	NaI 100 mg./kg. subcutaneous daily injection	6	4.33 ± .9††	1.14 ± .13†††

†Mean ± standard error — S.E. $= \sqrt{\Sigma \frac{(x_1 - \bar{x})^2}{n(n-1)}}$

††Significantly lower than untreated control value ($p < 0.01$) but not significantly different from cortisone ($p > 0.05$)

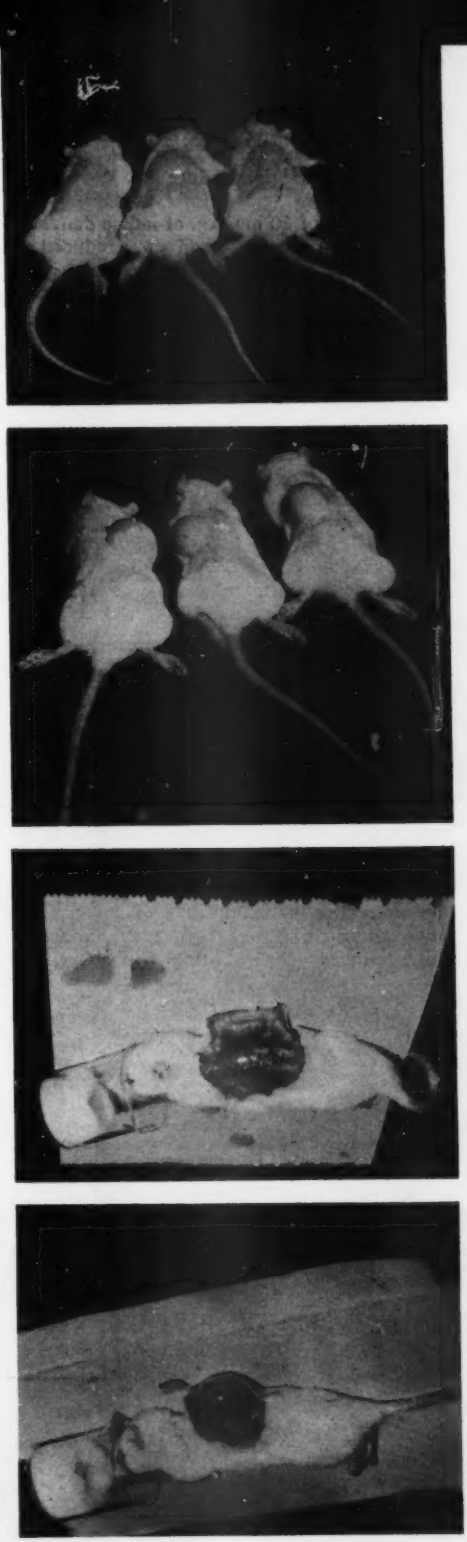
†††Significantly lower than untreated control value ($p < 0.05$) but not different from the cortisone treated value ($p > 0.05$)

such deviations imply that granuloma fluid exudate reducing activity is greater in cuprous iodide than in potassium iodide. This impression is further strengthened by "p" values derived from the comparison of each treated group with the control group.

The greatest response in the potassium iodide treated groups was noted in group 2 receiving 50 mg./kg. of iodide ion daily. This value differed significantly from the control at the 5% level. In the cuprous iodide treated groups, on the other hand, those receiving both 50 and 75 mg./kg. iodide were significantly different from the controls, the "p" value in both cases being less than 0.01.

The only significant difference in results between treated groups became evident in groups 6 and 7, which received respectively 25 and 50 mg./kg. of iodide as cuprous iodide.

The results of the activity of iodide on the formation of granuloma tissue are shown in



Illustrating the granuloma pouch technic of Selye, from top to bottom: Entire granuloma pouch after anti-inflammatory treatment; granuloma pouch without treatment; partial discetion of anti-inflammatory treated ganuloma pouch; and partial dissection of untreated ganoloma pouch.

table 3. Iodide, 76.5 mg./kg. daily derived from cuprous iodide, produced a highly significant decrease in tissue weight, as did the intermediate dose of 50 mg./kg. of iodide daily. The low dose, 25 mg./kg. each day, reduced the weight of tissue, but the result was not significant at the 5% level ($p>0.05$).

With potassium iodide, a significant reduction in tissue weight was achieved only with 75 mg./kg. of iodide administered daily ($p<0.02$).

Again as with the fluid exudate values, the response increased as the dose of drug increased. Graph 1 illustrates granuloma tissue weight values wherein the response, as a percent of the control value, is plotted against the logarithm of the iodide dose. The values for cuprous iodide fall on a straight line. The dose, is therefore, proportional to the response within the range of doses tested.

When plotted in an identical manner, the results with potassium iodide do not fall on a straight line. In this case, as in the results with the fluid exudate, the highest dose of potassium iodide (75 mg./kg. of iodide) did not give a response proportionately larger than the intermediate dose. These facts indicate that the upper limit of effectiveness of potassium iodide, as used in these experiments, has been approximated.

It may be noted from previous work[4] that cuprous iodide in an oral dose of 250 mg./kg. daily, representing 160 mg./kg. of iodide ion daily, reduced the fluid volume to an average of 1.7 cc. and the tissue weight to an average of 0.83 gm. These results indicate that cuprous iodide is not only more active than potassium iodide in reducing the fluid exudate at equivalent doses of iodide ion, but is also active over a greater dosage range.

TABLE 3. Fluid Volume and Tissue Weight of Granuloma Pouch with Various Treatments

Gr.	Treatment Iodide mg./kg./day and source	No. rats	Fluid volume§ cc.	Tissue weight§ gm.
1	Control—dist. H_2O 0.1 cc. daily	10	11.65 ± 1.65	2.87 ± 0.13
2	75—KI	10	8.85 ± 1.43	1.99 ± 0.29§§
3	50—KI	10	7.20 ± 1.71§§§	2.01 ± 0.26
4	25—KI	10	11.00 ± 2.35	2.36 ± 0.28
5	75—Cu_2I_2	9	4.61 ± 1.62§§§§	1.63 ± 0.30§§§§
6	50—Cu_2I_2	10	4.80 ± 0.79§§§§	1.80 ± 0.10§§§§
7	25—Cu_2I_2	10	8.55 ± 1.54	2.26 ± 0.35

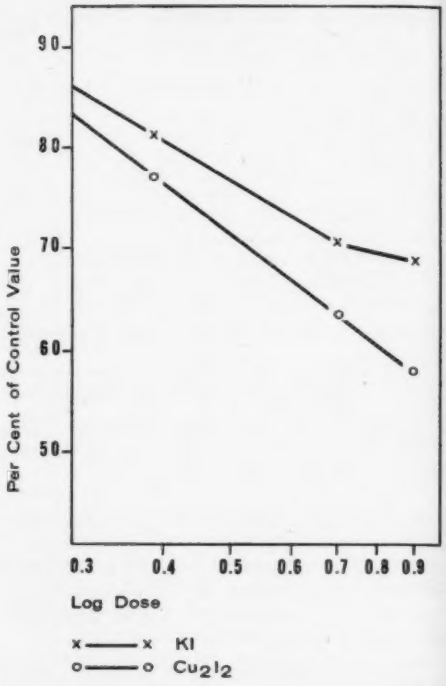
§Mean ± standard error — S.E. $= \sqrt{\Sigma \frac{(x_1 - \bar{x})^2}{n(n-1)}}$

§§Compared with control value $p<0.02$

§§§Compared with control value $p<0.05$

§§§§Compared with control value $p<0.01$

GRAPH 1. Dose Response Curve of Potassium Iodide and Cuprous Iodide on Tissue Weights in the Granuloma Pouch



Summary

Using the granuloma pouch technic as the standard test method, it has been demonstrated that (1) the iodide ion *per se* possesses anti-inflammatory properties, (2) that these anti-inflammatory properites are not dependent upon the adrenal, (3) that within limits, the responses to iodides are proportional to the dose, and (4) that cuprous iodide, in equivalent doses of iodide ion, demonstrates a greater activity than potassium iodide. In addition, it has been suggested that cuprous iodide is active over a greater dosage range than is potassium iodide.

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Radio-active Research Slated for Kansas University

A recent grant of $25,000. from the Mark L. Morris Animal Foundation has opened the way toward new researches with radio-active substances at the University of Kansas.

Recognizing the notable achievements with radioisotope tracer research in human deficiency diseases, this new research will extend such uses of radioactive tracers to the study of comparable nutritional deficiencies in small animals. It also will open the way for the modification of isotope tracer methods used with man for use in the diagnosis of metabolic diseases of animals.

Founder and president of the Foundation is Dr. Mark L. Morris of Topeka a noted consultant in the field of animal nutrition, whose achievements in the field led to the creation of a widespread program for the support of university research. In addition to the program at Kansas University, the Foundation supports research in this field at Cornell University, Rutgers University, University of Minnesota, Oklahoma State University, Colorado State University and Texas A. & M.

This project consists of a fellowship in radiation biophysics granted to Dr. Gilbert Fischer, a graduate of the School of Veterinary Medicine at the University of Illinois, who has completed a fifteen month internship at the Angell Memorial Animal Hospital in Boston. The fellowship will permit Doctor Fischer to study for a master degree in radiation biophysics.

Doctor Fischer will investigate the modification of radioisotope tracer methods by means of which the functions of the thyroid, pancreas, liver and endocrine glands in animals may be evaluated in relation to their effect on obesity and longevity. A portion of the grant provides funds for the purchase of equipment and supplies for the research.

The work will be the basis of a thesis in radiation biophysics under the direction of Dr. Frank E. Hoecker, professor of physics and biophysics, and Dr. Edward I. Shaw, assistant professor of radiation biophysics. It probably will cover a period of 2½ years.

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Insurance for Dogs

In making application for life insurance on dogs, identifying noseprints must be submitted with application. This requirement is subject of press release of the underwriters, Animal Insurance Company of America, 92 Liberty St., New York 5, N. Y.

A dog's noseprint is an identification pattern as infallible as a human fingerprint. The underwriters requirement is to prevent a substitution when a death claim is made. Application has a space set aside for the noseprint which will be compared with that taken after death on the death claim.

Taking a dog's noseprint is simple. No special equipment is required other than an ordinary ink stamp pad.

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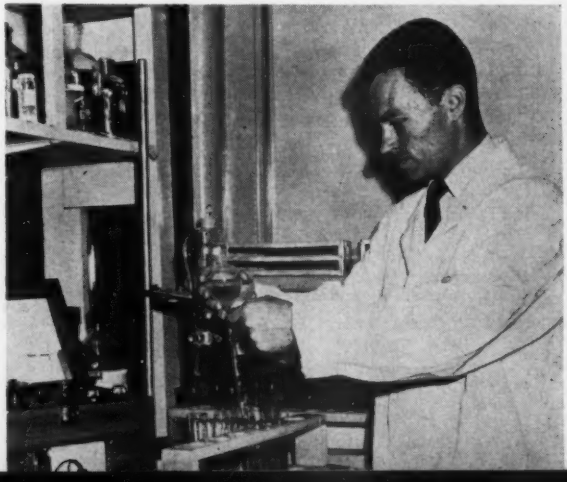
Tranquilizing drugs do not change permanently the disposition of patients.



Dr. Gilbert Fischer testing specimens for activity of radioactive iodine. The pH Meter in the lower left corner measures acidity or alkalinity of chemical fluids.

Concerning The Safety of N-Butyl Chloride As A Whipworm Anthelminitic

LEON F. WHITNEY, D.V.M., Orange, Connecticut

Based on a careful study, it has been shown that, in Connecticut, more adult dogs are infected with whipworms than with any other species of intestinal parasite. We know too that many cases are missed entirely because only a heavy concentration of $NaNO_3$ solution will float ova, and too often no hydrometer readings of the solution are taken before commencing a brine-flotation examination.

Several methods of whipworm eradication have been tried in the past. The first successful one was the author's hydrogen peroxide treatment administered as a 1.5% solution rectally. There was no question of the efficacy because every parasite touched by the peroxide solution was destroyed. Unfortunately the peroxide gives off five times its own volume of oxygen which sometimes ballooned sections of the intestine and produced hemorrhagic patches, the dog passing bloody stools for a few days which alarmed owners. This theoretically good idea proved impracticable in practice.

Next, *n*-butyl chloride was tested and advocated. It certainly destroyed the worms which it touched, but since many of the worms were sheltered in the cecum and since *n*-butyl chloride proved exceedingly nauseating at the dosage necessary to destroy whipworms, it was almost useless.

The idea of using an antiemetic with *n*-butyl chloride was tried with fair success. If a barbiturate was used, the dog needed to be so far anesthetized as to appear intoxicated, in order for one to be reasonably certain the dog did not vomit when the anthelmintic was given.

After both of these latter methods, physics were advocated.

A third method was invoked with the drug whipcide.® This enabled the veterinarian to do a fairly satisfactory job, although fecal examinations before and after administration did not indicate as thorough a clean-out as could be desired.

In 1954 Dr. George D. Whitney and the writer published a paper in which was discussed a method which worked out in our practice.* It involved using *n*-butyl chloride in repeated doses. This present paper continues that discussion and sets the safe, effective dose based on deworming hundreds of dogs by the method. I can now report on its safety, efficiency, and the effect of repeated doses on general health and fertility.

The method employed is: After fasting for 24 hours, the dog is given 1 cc. of *n*-butyl chloride for each 10-12 lb. of body weight. The dose is repeated every hour until five doses have been given. No physic is administered so that the drug may enter the cecum. Two hours after the last dose a feeding is given. The drug also eliminates hookworms and roundworms. Actually, each dose is almost the single recommended dose for these two parasites, but for whipworms it is given five times.

I have tried one-half this amount, two, three, and four doses, making fecal examination after each system. The five-dose method is nearly 100% effective.

Nausea is also never observed because individual doses are so small they produce no discomfort. I do not think it produces a cumulative effect but merely keeps a concentration sufficient to kill intestinal parasites moving through the intestines and into the cecum, so there is little chance of parasites being missed. A physic defeats the purpose and because of the low toxicity of *n*-butyl chloride is not needed.

In our experimental kennel there are about 60 mature Redbone Coonhounds and Beagles are maintained at all times. Every dog has been treated, including pregnant bitches, every three months for two years. Besides these, all older puppies which exhibit any whipworm eggs in the stools are dewormed by the method.

In the Whitney Veterinary Clinic several hundred dogs have been successfully treated by the divided dose method.

Only three sizes of capsules have been used: 1 cc., 2.5 cc., and 5 cc. A Beagle or Cocker Spaniel is given 2 cc.; a Setter, Pointer, Coonhound, German Shepherd 5 cc. in each dose. Great Danes, St. Bernards, Newfoundlands, 10 cc. It has not been found necessary to be exact in figuring dosage.

No ill effect of any kind have been observed. It has not stopped or set back growth, nor caused abortion, nor interfered with subsequent fertility. In all, nearly 2,000, 5 cc. capsules, over 300, 2.5 cc., and over 3,000, 1 cc. size have been administered with no deleterious effects and with a most efficient result.

®Pitman-Moore Co., Indianapolis, Ind.

*Whitney, Leon F., and Whitney, Geo. D., The Removal of Whipworms by *n*-butyl Chloride. *Vet. Med.*, 49:78 (Feb.), 1954.

The Veterinarian

Photograph of the handsome statue and sculptured relief in the background adorning the beautiful Quadrangle of the School of Veterinary Medicine, Iowa State College, Ames. It has been suggested that this well-executed work of Sculptor Christian Petersen form the basis for a commemorative stamp honoring the veterinarian.

We are grateful to Dean I. A. Merchant and Mr. Christian Peterson for supplying the photographic study from which this engraving was prepared.

A Stamp to Honor the American Veterinarian

HAROLD J. ASHE, Beaumont, California

Viewed by any standard, the contributions of the veterinary profession to agriculture and public health, as well as to the welfare of mankind, deserve recognition. With the approaching centennial of the founding of the American Veterinary Medical Association, it would seem appropriate that a special commemorative stamp be issued to honor as one the veterinarian and his profession. It is not too early to consider a design appropriate to the subject and accurate in details.

The first commemorative stamp was issued in 1893 as an adjunct to the public relations program attending the World Fair at Chicago, and at the same time marked the 400th anniversary of the discovery of America by Christopher Columbus. The issue itself spelled out a humble tribute to greatness, and as such it was passed into the hands of all who used the United States mails. Since that time the first commemorative issue has become a collector's item, a rare gem vied for by philatelists.

Anyone who has read the record can hardly deny the greatness of the veterinary profession. This is not to say that in its march through the years the veterinary profession has always been wise, for greatness does not imply wisdom. It implies rather the full use of its position in culture and science, and in this sense the veterinary profession has manifested greatness. It has, so to speak, put flesh on the skeletal frame of scientific progress in the field of animal medicine. For this it deserves recognition.

Now, within the shadow of its 100th anniversary in the United States, the veterinary profession stands ready to join the hundreds of other professions, events, persons, industries — all of them commemorated with a special issue of postage stamps — who have put on the cloak of age and achievement.

History of Commemorative Issues

During the 50 years following the issuance of the first commemorative stamp, several hundred designs were ordered by Congress as tributes to famous people, historical events, and American shrines. In 1944, however, a sharp departure was made in subjects of commemorative postage stamps. In that year four special stamps were issued honoring a number of industries, among them the railroad, steamship, telegraph, and motion picture industries.

In the past several years, diverse groups, industries, professions and associations have had special stamps issued as congressional endorsements to the part they played on the American scene. These include doctors, youth, the poultry industry, volunteer firemen, Boy Scouts, 4-H Clubs, the American Bar Association, and many others. A move is now underway to get a stamp honoring dentists.

Why not a stamp honoring American veterinarians and veterinary medicine? Both as individuals and as members of a professional group, veterinarians have much to point to with

pride. Modestly, but in all seriousness, the veterinarian has more claim to recognition than a number of groups and industries thus far honored.

This recognition, however, may come only if members of the profession insistently urge issuance of such a special postage stamp. What should be done? Local, state and national societies should develop designs. These should be discussed in the literature. Ultimately associations should pass resolutions asking for the issuance of such a commemorative stamp. These resolutions should be backstopped with cogent reasons why this honor is deserved and long overdue. In addition, individual veterinarians should address letters to their Congressmen enlisting his support in the project. Letters should go also to the Postmaster General, Washington 25, D. C.

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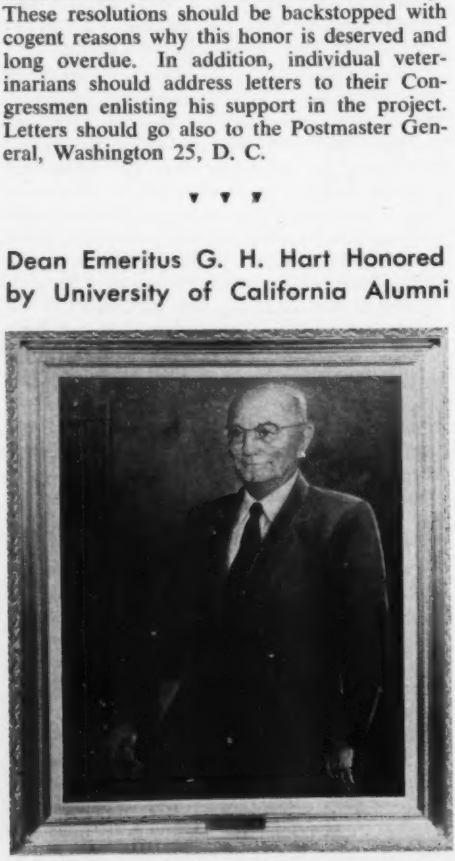
Dean Emeritus G. H. Hart Honored by University of California Alumni



A portrait of Dr. G. H. Hart, dean emeritus of the School of Veterinary Medicine, University of California, Davis, was presented to the school last January during the annual Midwinter Conference. Funds for the painting were raised by alumni who were in school during Doctor Hart's tenure of office.

Doctor Hart became dean in 1948. He retired five years later, in 1954.

Michigan Forms Advisory Committee

The formation of a Citizens Advisory Committee to the Michigan Veterinary Medical Association was announced recently by Dr. Stephen R. Kelly, president.

Members of the Committee, the first such non-professional advisory council in the 75-year history of the M.V.M.A., are Keith Middleton, prominent Lake Orion (Michigan) dairy farmer; S. P. Clickner, Detroit dog fancier and breeder of show dogs; and Clifton Johnson, managing director of the Michigan Humane Society.

The Committee will provide the non-professional point of view on matters of veterinary medical practice in the care of large animals, small animals, and in the public service field.

"We believe the availability of such counsel and guidance will contribute substantially to a better understanding between the veterinarian and his clients," Doctor Kelly stated.

"As with human medicine, the practice of veterinary medicine has become increasingly complex due to the development of new medications, drugs, and surgical technics. We feel that there is a vital need for closer contact with public attitudes to insure a continuing high level of professional service."

There are now more than 600 veterinarians engaged in large and small animal practice and in public health service in Michigan.

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A Practitioner's Dream

Probably every practitioner dreams of the day when one of his wealthy clients dies and leaves him a sizeable legacy. And why not. It has happened and not too infrequently. Recently, a woman phoned to say that she was making out her will and would it be all right to leave me a bequest. I got so excited I could hardly mumble that it would be appreciated. Then she added that she would like to leave $5000. to care for the pets of indigents; but the woman is only about 40 years of age and healthy. Surely, she will out live me by at least 20 years and there goes my dream of a new hospital again. *—Clifford L. McGinnis, D.V.M.*

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Household pets in the U. S. consume over 2,000,000,000 lb. of food annually.

Novobiocin Therapy In Feline Pneumonitis: A Case Report

LEWIS K. TODD,* D.V.M., and
HOWARD L. WRIGHT,* D.V.M.,
Tacoma, Washington

Two previous reports[1,2] on use of albamycin® (novobiocin) in dogs and cats have been published in the recent literature. One of these[2] included two cases of feline pneumonitis treated by oral and parenteral routes. The present report summarizes experience with the antibiotic in 21 additional cases of feline pneumonitis, with special comment on eight typical cases.

Feline pneumonitis is caused by the virus *Miyagawanella felis*, a member of the psittacosis-lymphogranuloma venereum group. In human beings, *M. psittacii* causes psittacosis or ornithosis, *M. lymphogranulomatis* causes lymphogranuloma venereum, and *M. pneumoniae* causes primary atypical pneumonia. Feline pneumonitis is highly infectious. It is characterized by sneezing, coughing, mucopurulent oculonasal discharges, febrility, and malaise.

®The Upjohn Company, Kalamazoo, Mich.
*Lakewood Veterinary Hospital.

Data on eight representative cases of feline pneumonitis are presented in table 1. Patients range in age from four months to three years; weights range from 3½ pounds to eight pounds. Treatment was initiated by intramuscular injection of albamycin, usually as a single intramuscular injection, incorporating the appropriate dose (7 to 10 mg. per lb.) in ½ cc. of the supplied diluent. Continuing treatment, on hospitalized or outpatient basis, consisted of oral administration of albamycin syrup (125 mg. novobiocin calcium per 5 cc.), at levels ranging from 12 to 20 mg. per lb. Total dosage during the course of albamycin therapy ranged from 100 to 1,650 mg. Response was generally excellent. Temperatures returned to normal within 24 to 48 hours in the majority of the cases, and within four days in two of the reported cases. Average course of therapy was five days.

REFERENCES

1. Haas, K. B., Connor, N. D., and Davidson, J. L., Oral Use Of A New Antibiotic In Dogs and Cats. *Vet. Med.*, 51:581, 1956.

2. Todd, L. K., and Wright, H. L., Oral And Parenteral Albamycin Therapy In Cats. *Vet. Med.*, 52:399, 1957.

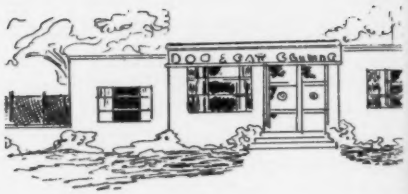
TABLE 1. Parenteral and Oral Albamycin Therapy in Feline Pneumonitis

Age yr.	Symptoms	Wt. lb.	Dose	No. days treated	Total dose mg.	Response	Comment
6 mo.	103.5 F., anorexia, pneumonitis	6	20 mg./kg. i.m. 3 days; 40 mg./kg.; orally 4 days	7	950	102.4 F., 24 hr.; 101.6 F. and resumed eating 72 hr.; complete recovery, no relapse	Supportive therapy (B-complex normal saline glucose)
3	103.8 F., anorexia, severe pneumonitis	7.5	18 mg./kg. i.m.	5	250	103.0 F., 24 hr.; 101.2 F. and resumed eating 5th day	Supportive therapy
4 mo.	102.4 F., eating, sneezing, coughing, mild pneumonitis, offspring of above	3.5	20 mg./kg. i.m.	3	100	102.0 F., 2 hr.; sneezing & coughing continued for 1 wk. after therapy; complete recovery	
2	104.0 F., anorexia, coughing, pneumonitis	7.5	16 mg./kg. i.m. 30 mg./kg. orally b.i.d.	10	1650	102.0 F., 24 hr.; eating 72 hr.; coughing for 2 weeks after therapy; complete recovery	
6 mo.	102.0 F., mild pneumonitis	5	25 mg./kg. orally	7	385	Complete recovery	
2	103.0 F., cough, pneumonitis	8	18 mg./kg. i.m. 3 days; 30 mg./kg. orally b.i.d.	3+	-	101.4 F., 72 hr.; eating; coughing continued for 2 weeks; complete recovery	Outpatient
3	103.0 F., cough, pneumonitis	8	18 mg./kg. i.m. 3 days; 30 mg./kg. orally b.i.d.	3+	-	101.4 F., eating, 72 hr.; coughing continued 2 weeks; complete recovery	Outpatient
4 mo.	103.0 F., pneumonitis	4	15 mg./kg. orally t.i.d.	3+	-	Complete recovery	Outpatient

CLINIC

CLIFFORD L. McGINNIS, D.V.M.

Peoria, Illinois



Summer Eczema

By the time this appears in print, autumn will be here, we will have had our first frost, and the complex problem of why dogs scratch in July, August, and September can be filed away for another year. It might be helpful and worth while to review this past summer's experience with summer eczema.

I spent nine months of World War II in Manila during a dry season at a time when every American G.I. started to scratch. It was a nonspecific eczema and the medics had us painted with every imaginable color and every imaginable drug. As I remember, the predominating colors were yellow and purple. It was the darndest itch. It would start with a tingling sensation on the skin, then it would feel like a saber dance with needles. Due to the inevitable scratching there soon would be a patch of moist eczema. I believe this must be similar to a dog's sensation when it starts to itch.

The natives told us that as soon as the rainy season started, our skins would all clear up—and they were right. By the same reasoning, I tell owners that if we can only keep their pets comfortable until after the first frost, all will be well.

This summer we have used a considerable amount of meticorten® subcutaneously, and it has served wonderfully well. We use the recommended dose of 1 mg. per lb. body weight.

Our experience with it may or may not compare with yours. None of the cortisone products, given orally appear to relieve symptoms of pruritus.

If a dog is presented with moist, weepy lesions, meticorten does not hasten recovery of that specific area, but it does appear to relieve the itching sensation. When used on the dog that scratches all day and night, but has no open lesions, the first dose protects for from three to four weeks. Subsequent doses appear to give relief of slightly shorter duration as the number of injections increase.

We have at least a dozen cases that are referred to us every summer because of chronic skin lesions with pruritus. We have given these patients a lot of comfort last week in August and the first week in September.

At this point we have had to resort to the old methods used in our practice for years, which are known to have only limited value. These include: Change diet, avoid lawn grasses and weed patches, apply therapeutic agent in baths, administrate foreign proteins, local application of drugs as lotions, ointment, et cetera.

Appetites are voracious following the use of meticorten and the obese dog generally becomes even more obese. We warn owners to restrict food intake. We also warn them to keep the back door unlocked, because urine out-put is tripled for a few days post-treatment.

We have not observed any ill effects from its use but we have made a lot of people happy this summer. Now we are anxious to know if it will work as well on these same dogs next summer.

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The ligament on the right ovary of dogs is always shorter than the left. Sometimes on the spay operation it is impossible to get the ovary through the skin incision so it can be easily ligated. When this happens, the belly opening should be enlarged to admit the index finger. Then, with the ovary held taut by strumming the ligament as one would a guitar string, it will break down without rupturing the artery. After that it can be easily withdrawn from the belly and ligated.

In closing the wound, a row of interrupted cat gut sutures should be burried through the fascia, muscle, and peritoneum. By closing the skin wound with cat gut, removal of the suture becomes unnecessary.

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Does anyone know how to trim toenails without making one or more bleed? We use a styptic powder that we get from a barber supply house to stop bleeding. It is basically ferric sulphate. I would be interested in hearing of anything better. Its worth $10. to trim the nails of some dogs.

®Schering Corp., Bloomfield, N. J.

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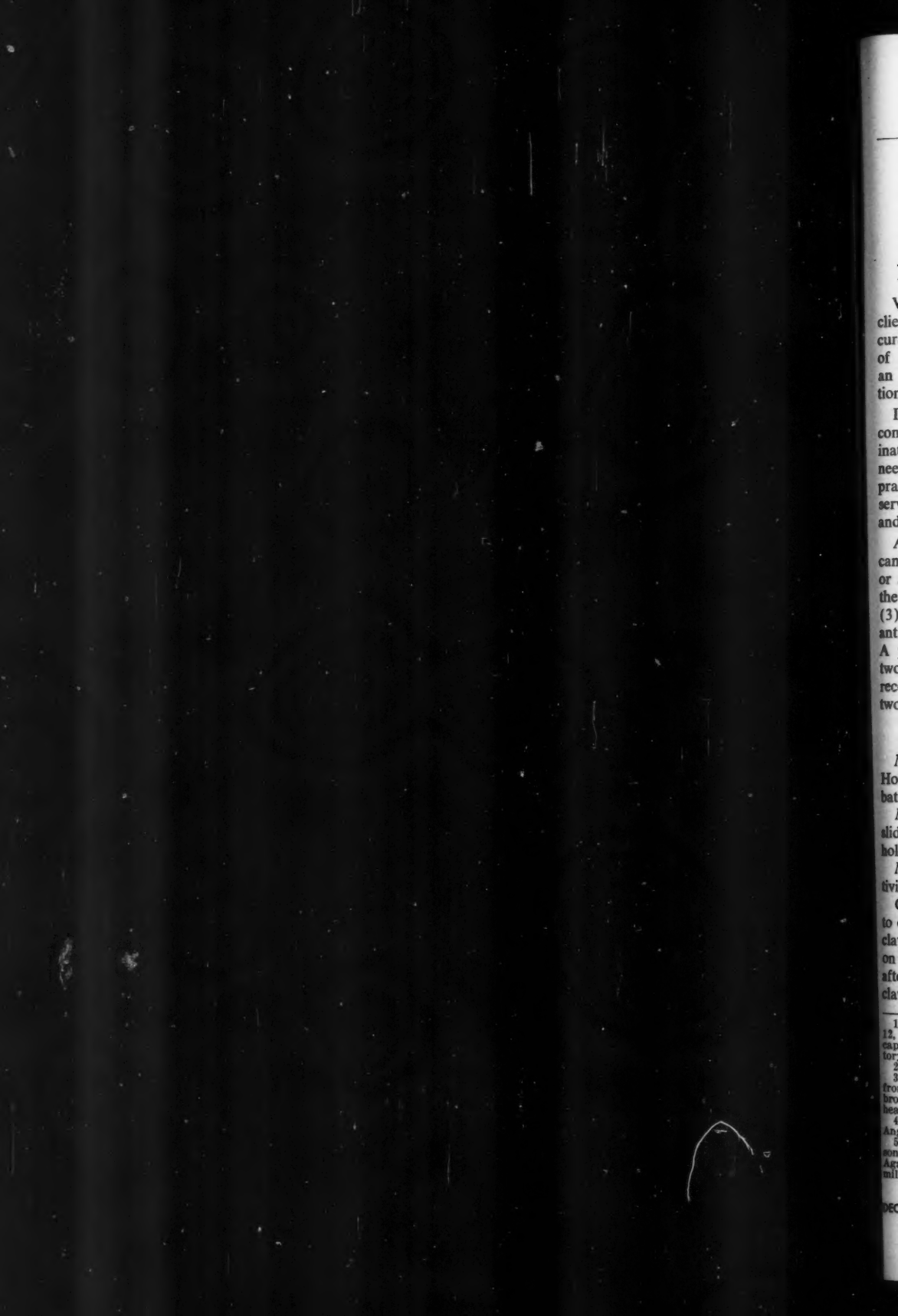

THE PRACTITIONER'S LABORATORY

WILLIAM L. SIPPEL, B.S., V.M.D., M.S., Ph.D.
Kissimmee, Florida

Laboratory Tests for Mastitis

Veterinarians in dairy sections can assist their clients in mastitis control by furnishing accurate information on the bacteriological status of udders. Only with such information can an intelligent approach to control and eradication be made.

In areas having a state supported mastitis control program utilizing bacteriological examination of milk samples, there will be little need for this service to be furnished by the practitioner. However, in states where this service is not provided it will be a practice and dispensing business builder.

A series of tests for detection of mastitis can be performed readily by the practitioner or an assistant trained by him. These include the (1) Hotis test, (2) the Breed smear, and (3) culture of positive milk samples and the antibiotic sensitivity testing of the organisms. A practitioner can do number one, one and two, or all three, as desired. It is strongly recommended that at least numbers one and two be performed.

Equipment Needed

No. 1: Milk sample bottles and screw caps[1]; Hotis test solution[2]; pressure cooker; incubator.[3]

No. 2: Bacteriological loop[2]; microscope slides[2]; methylene blue stain[2]; xylene[2]; alcohol 95%.[2]

No. 3: Blood agar plates[4]; antibiotic sensitivity discs.

One milliliter of Hotis test solution is added to each vial which is then sterilized in an autoclave or pressure cooker. The lids are put on loosely for autoclaving and tightened only after cooling following removal from the autoclave.

It is suggested that the fee for the test be collected at the time the bottles are given to the dairyman. Fewer bottles are lost this way. It is preferable for the veterinarian to demonstrate disinfection of the ends of the teats with cotton and alcohol the first time so a minimum of manure contaminated samples will be received at the later tests.

Procedure No. 1

When the samples are received they are incubated at 37.5 C. (98.6 F.) for 18-24 hours and examined. They are then returned to the incubator and incubated an additional 24 hours and read again. If mastitis organisms are not present the color of the milk will remain unchanged, a light purple. The presence of *Streptococcus agalactiae* is indicated by yellow colonies on the sides of the tube, yellow sediment in the bottom of the tube, or a yellow-green color of the milk (fig. 1).

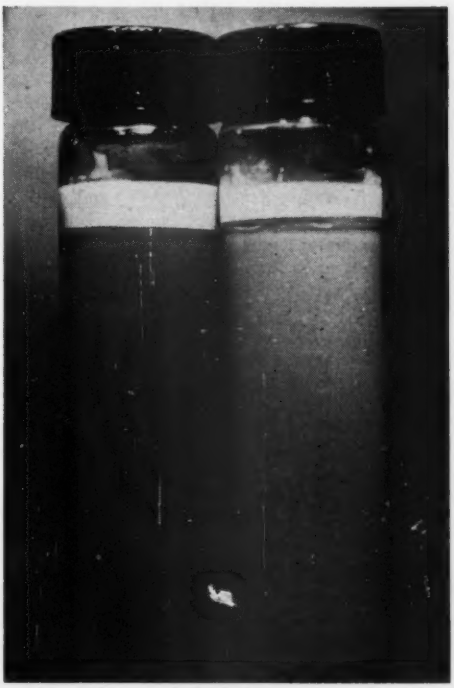

Figure 1.

1. A. S. Aloe Co., 5566 Kingsbury St., St. Louis 12, Mo. Bottles — Cat. No. 81821-26. Order with caps. Equivalent bottles available from all laboratory supply houses.
2. Purchase from veterinary supply house.
3. A very satisfactory incubator can be made from an old refrigerator equipped with a chick brooder wafer thermostat and a light bulb for heat source.
4. Hyland Laboratories, 4501 Colorado Blvd., Los Angeles 39, Calif.
5. Bryan, C. S. and Devereux, E. D., A Comparison of the Microscopic Test, Hotis Test and Blood Agar Plate in Detecting Streptococci of Mastitis in Milk. *Cornell Vet.*, 27:67, 1937.

Micrococci (staphylococci) produce a slight fading of the normal color and red to rust colored flakes on the side or sediment in the bottom of the tube. Colon organisms (usually contaminants) often cause a peptonization of the milk in which the column becomes whey-like with a curd in the bottom of the tube. In recent years in many areas, micrococci (staphylococci) have become the most frequent and most troublesome cause of mastitis.

Bryan and Devereaux[3] found that the 24 hour incubation of quarter samples revealed 64.3% of mastitis streptococci as compared with the microscopic examination of Breed smears. Forty-eight hour incubation raised the level to 78.6%.

Procedure No. 2

It is recommended that all positive samples be smeared on slides and stained in order to make definitely identify organisms involved. It is preferable to examine all samples in this manner. Four samples can be examined on a single slide. A drop of milk from a well shaken tube (after 24 or 48 hours incubation) is placed on the slide and smeared into the shape of a centimeter square. These are air dried and placed in xylene for one minute. After drying, they are placed in alcohol for one minute. The remainder of the procedure is as follows: Dry and place in the stain one to two minutes. After drying, rinse in tap water and examine. One pound butter dishes for the stains and a slide rack that holds 12 slides will greatly facilitate the staining procedure. The high dry lens (470X) will usually give sufficient magnification to distinguish the long chain streptococci (usually *Streptococcus agalactiae*) from short chain varieties and micrococci (staphylococci).

Procedure No. 3

To do a complete job it is necessary to know whether the micrococci (staphylococci) involved are hemolytic (a commonly used criterion for pathogenicity). To determine this, it is necessary to plate the samples in question on blood agar plates. These can be made or purchased.[4] Hemolysis is indicated by a clearing of the media surrounding a colony, a greenish color in this area, or a combination of both.

The mastitis problem facing many practitioners today is what to do with stubborn cases that have been treated unsuccessfully by the farmer. In order to approach this intelligently it is necessary to run an antibiotic sensitivity test on a sample from the quarters in question.

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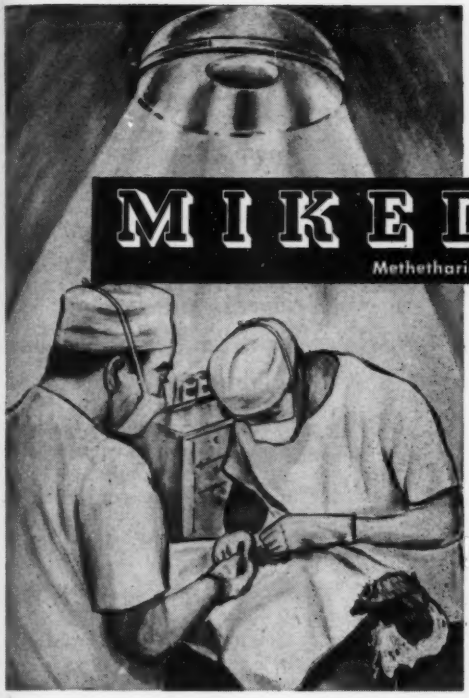
International Conference on Livestock Stress

The world's first concerted scientific effort to determine the effects of unusual stress on the health, weight and meat quality of livestock, and to seek new methods of preventing such stress, will be made at Kansas City, Mo., on December 10, when leading veterinary authorities from many states and several foreign countries will gather at the First International Research Conference on the Effects of Stress on Livestock. The conference is being sponsored by Jensen-Salsbery Laboratories of Kansas City, Mo., and will convene at the Muehlebach Hotel as an all-day conference.

That stress has been an important factor in the Incidence of "shipping fever" and other diseases has been recognized for some time, to such an extent that these diseases have become known under the general name of "stress diseases." In addition to actual disease, however, stress is believed to be the principal cause of weight loss and injuries in shipment and of what is known as the "dark cutter syndrome" a condition which affects the quality of meat of livestock. It is thought to be the effect of stress causing incomplete drainage of blood after slaughtering. The combined economic loss directly ascribable to stress disease is claimed to approach $1,000,000,000 annually.

Among those who will participate in conference deliberations will be Dr. A. H. Quin, former president of the American Veterinary Medical Association who will be chairman; Dr. Carl A. Brandly, dean of the School of Veterinary Medicine at the University of Illinois; Dr. Harold D. Hedrick, Professor of Animal Husbandry at the University of Missouri; Dr. Nelson B. King, research veterinarian of the Ohio State University, Agricultural Experiment Station; Dr. Roy S. Nichols, professor of veterinary physiology of the University of Wisconsin; Dr. Alvin B. Hoerlein of the School of Veterinary Medicine of the University of Illinois; Dr. S. K. Sinha, formerly of the University of Manila and the University of Pennsylvania, now director of biological research at Jensen-Salsbery Laboratories, Kansas City; Dr. A. R. Haskell, director of pharmacological research at Jensen-Salsbery; Dr. M. D. Sutter, Jensen-Salsbery, director of field research and Mr. Ray Cuff, Kansas City Livestock Commissioner.



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The French Horse

To the average observer it might have appeared that there was a minimum of clear, high purpose to the life of Slim Ronsim. He was tall, walked with an inglorious gait, drank almost anything without complaint, and was generally considered rather worthless. But Slim was a horseman, and in the 114th Cavalry Regiment just prior to WWII, an expert horseman was hard to find.

The animals belonging to the Kansas National Guard unit were as gentle as plow horses for the most part, and horse soldiering was a pretty tame affair. Slim made an excellent figure in the saddle, especially when "posting," an army form of riding that defies description and not many cowboys can even stand to watch. Although Slim could and did absorb a staggering amount of insult without complaint, he was apt to be delicate when someone mentioned his "posting." It was frequently offered as a topic for conversation.

During the Minnesota maneuvers in 1940, Slim came into his own. He was credited with a ride that won for him the respect of the Kansas horse soldiers and at the same time forever scuttled all nasty cracks about Ronsim's "posting" in the saddle. And a French horse had something to do with it.

National Guard units did not have enough mounts for all of their members in those days; in fact, they usually had just half enough. The officers and noncoms got the best mounts, then the older men had their choice. The worst of the lot went to the rookies. When the Kansans arrived in Minnesota, the Army generously furnished them with remounts.

Remounts were semi-trained horses of unknown ancestory, most of them fresh from the Wyoming mountains. This particular bunch had been sold to the French Army. Due to the fall of France in the spring of 1940, that un-

fortunate country was unable to take delivery. What really burned off the boys was the fact that the government rented the horses back from France at $2. a day. The horse soldiers were paid only $1. a day and had to groom the nags to boot.

One of the French horses developed into something of a bucker. It slammed two or three Kansans into the dust so hard that they were forced to spend the rest of the maneuvers in the hospital at Little Falls. Finally the commander took the gamy outlaw out of action. There was a standing bet for miles around that even Slim Ronsim couldn't ride the Wyoming bucket of jolts.

Slim got wind of the talk one Sunday morning, shortly after some of his buddies had poured him into his tent.

"One shot of whiskey," he shouted. "One shot and I'll ride that French horse."

The really bright boys cut out the French horse and then hauled out Slim. Bets were running high. With all the money down, disaster struck. There wasn't a shot of whiskey in the entire area.

"Give me the bottle," Slim growled.

They gave him the bottle. He took a deep whiff, and climbed aboard. The bronc went high, broke in two, slammed down hard, then issued a spine rattling shoulder whip. On the second jump the French nag merely repeated its tricks, crashing into the dust like a keg of railroad spikes. Slim grabbed leather on that one and held tight. He was bleeding from his nose and ears. Three furious, belly-full-of-springs jumps and the horse broke into a run, heading due north. And that was the last anyone saw of Slim until he brought the horse back an hour later.

The boys who had bet against Slim paid off, but all Slim ever got out of that ride was one smell of whiskey.—*Charles Walters Jr.*

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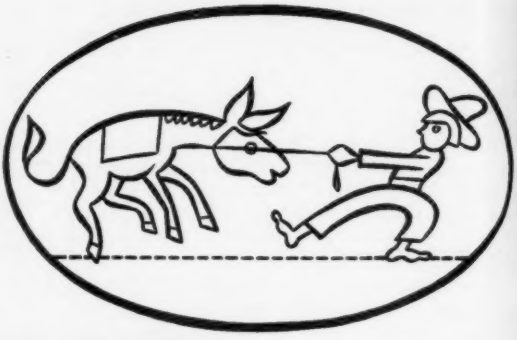

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C. W. Carlson, nutritionalist at South Dakota Agricultural Experiment Station (*Poultryman*, April 12, 1957) reported that tranquilizers may quiet growing turkeys and suppress their desire to fight but as least one, reserpine, is detrimental to growth and feed efficiency at levels 0.5 and 1.0 mg. per 1000 kilograms of diet.—*W. R. Hinshaw, D.V.M.*

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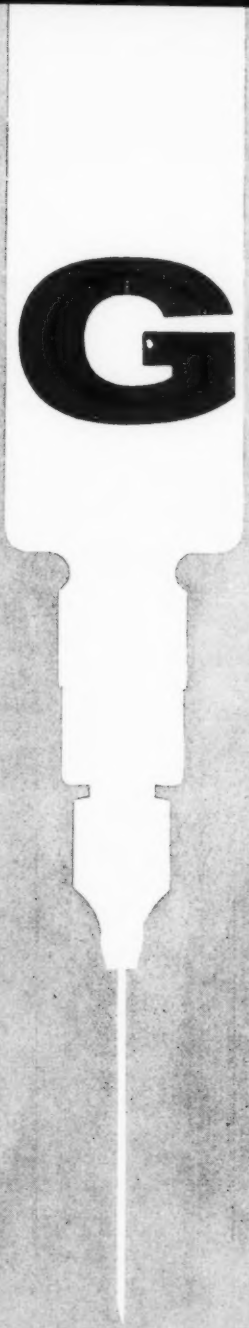

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Arizona Veterinary Medical Association. Annual Meeting. Hiway House Hotel, Phoenix, Ariz., 2:00 p.m. Dec. 1 through 3rd.

University of Pennsylvania. Fifty-eighth Annual Conference of Veterinarians. School of Veterinary Medicine, University of Pennsylvania, Jan. 7-8, 1958. Dr. James Mark, program chairman.

New York State Veterinary College. Fiftieth Annual Conference for Veterinarians. Cornell University, Jan. 8-10, 1958. Dr. W. A. Hagan, Cornell University, Ithaca, N. Y., dean.

Oklahoma Veterinary Medical Association. Forty-third Annual Meeting. Hotel Lawtonian, Lawton, Okla., Jan. 9-10, 1958. Mrs. Larma Bennett, 2805 S. 51st St., Oklahoma City, Okla., executive secretary.

Kansas Veterinary Medical Association. Fifty-fourth Annual Convention. Hotel Broadview, Wichita, Kans., Jan. 12-14, 1958. Dr. K. Maynard Curts, 5236 Delmar Ave., Kansas City 3, Kans., secretary.

Iowa Veterinary Medical Association. Annual Meeting. Hotel Fort Des Moines, Des Moines, Ia., Jan. 14-16, 1958. Dr. F. B. Young, Waukee, Ia., secretary.

Indiana Veterinary Medical Association. Annual meeting. Hotel Severin, Indianapolis, Ind., Jan. 15-17, 1958. Dr. L. M. Borst, 3315 Shelby, Indianapolis, Ind., secretary.

Michigan State University. Thirty-fifth Annual Post Graduate Conference for Veterinarians. College of Veterinary Medicine, Michigan State University, East Lansing, Mich., Jan. 22-23, 1958. Dr. W. W. Armistead, dean.

Louisiana State University. Department of Veterinary Science Conference. Louisiana State University, Baton, Rouge, La., Jan. 28-29, 1958. Dr. W. T. Oglesby, department head.

Missouri Veterinary Medical Association. Annual Meeting. Hotel Continental, Kansas City, Mo., Feb. 9-11, 1958. Dr. W. L. Schondelmeyer, 116 E. Maple, Independence, Mo., convention chairman.

American Animal Hospital Association. Fourth Region Annual Meeting. Veterinary Clinic, Colorado State University, Fort Collins, Colo., Feb. 16, 1958. Dr. D. T. Albrecht, chairman.

Colorado State University. Nineteenth Annual Veterinary Conference. Glover Veterinary Hospital, College of Veterinary Medicine, Colorado State University, Fort Collins, Colo., Feb. 17-19, 1957. Lloyd C. Moss, Dept. of Medicine.

Illinois State Veterinary Medical Association. Seventy-sixth Annual Convention. LaSalle Hotel, Chicago, Feb. 17-19, 1958. C. B. Hostetler, 1385 Whitcomb Ave., Des Plaines, Ill., executive-secretary.

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*Leonard, Ellis P., Pups by Trans-Atlantic Artificial Insemination. New Knowledge About Dogs. Gaines Veterinary Symposium, Oct. 24, 1956.

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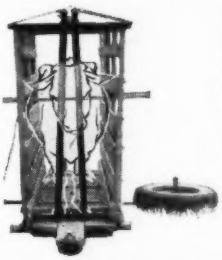

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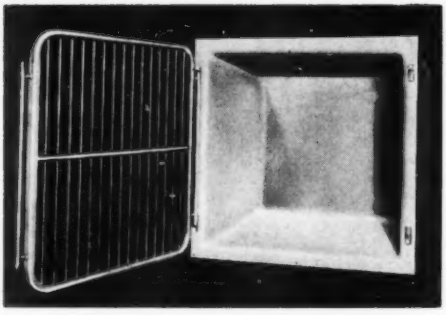

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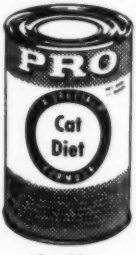

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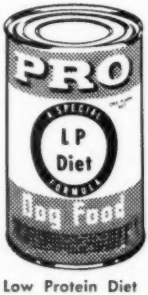

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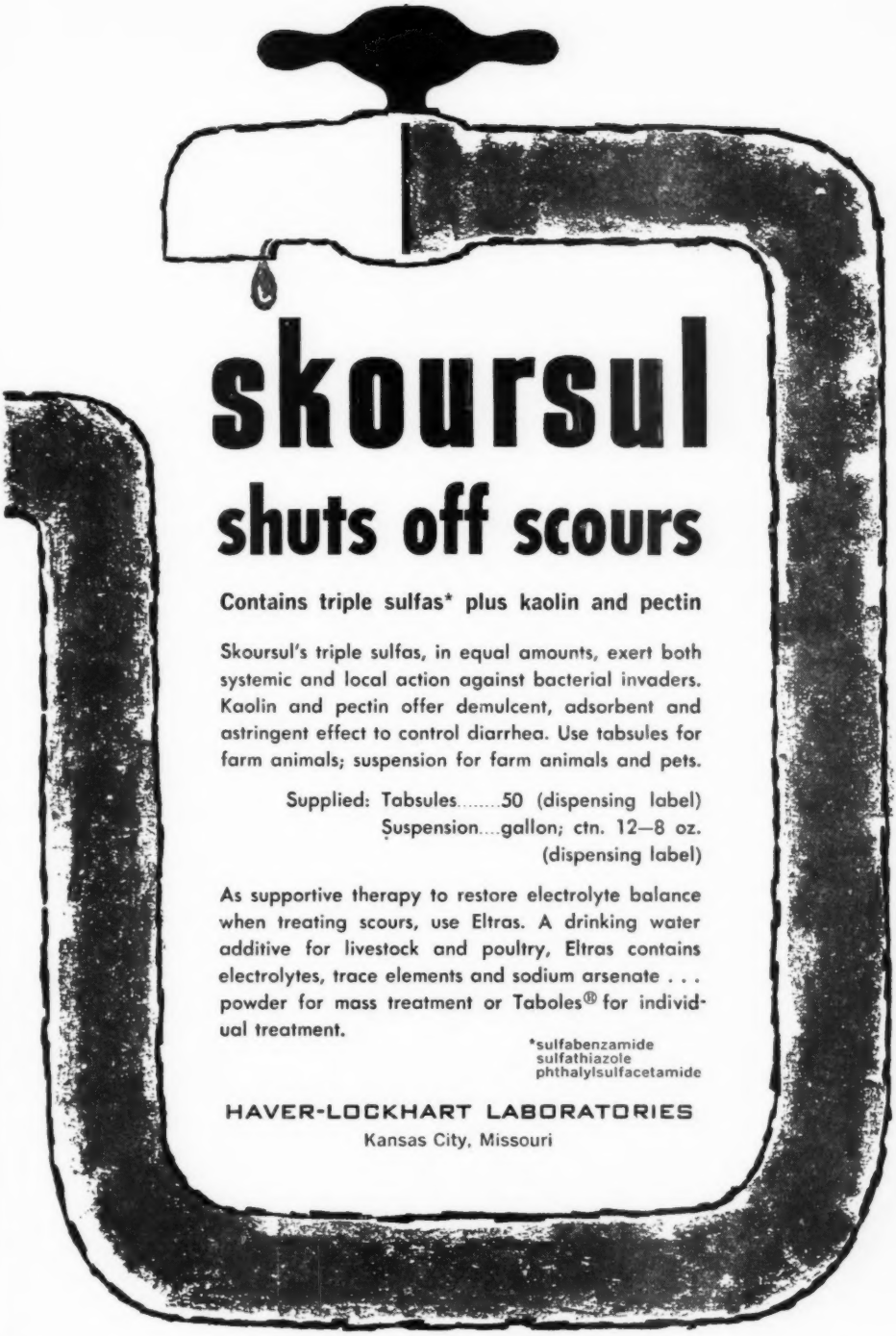

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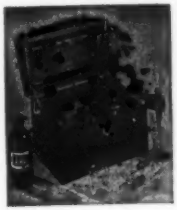

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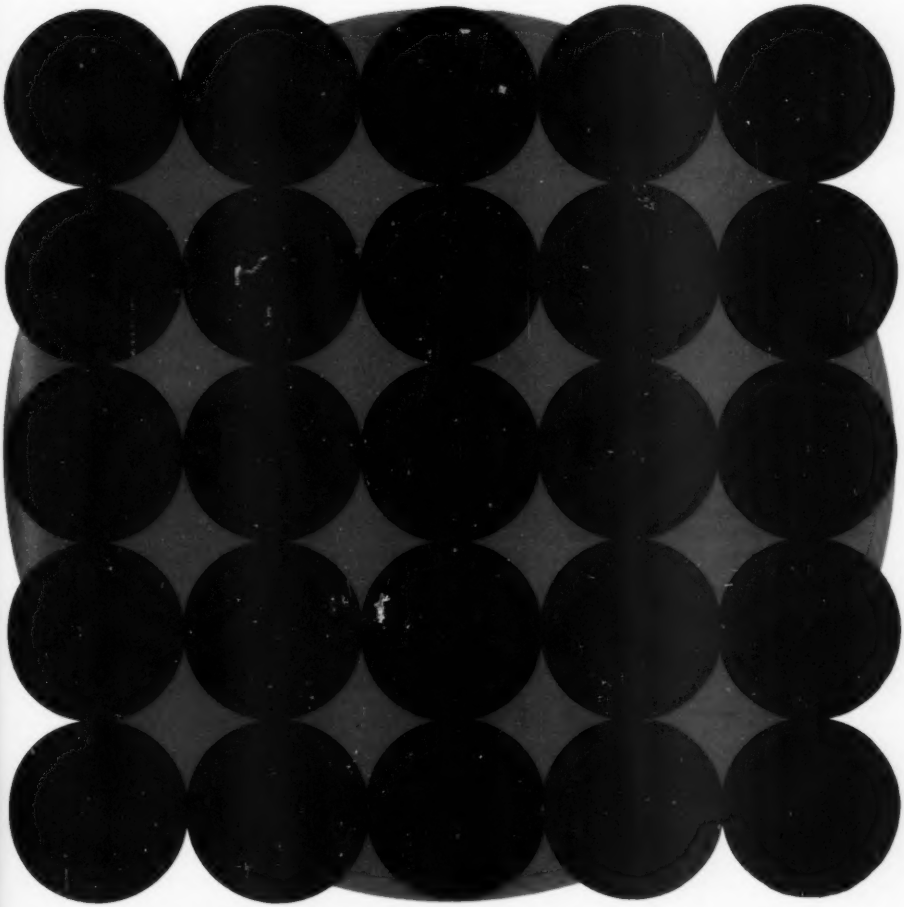

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J. R. Fisher, Brandon, Manitoba, Canada, OVC '19, December 29, 1956.

Milton I. Brown, Perry, Iowa, ISC '23, July 1, 1957.

Coleman P. Calloway, San Antonio, Tex., KCV '15, Aug. 18, 1957.

Fred H. Conover, Bloomington, Ill., ONT '34, Aug. 20, 1957.

Edward W. Elliott, Park River, N. Dak., ONT '10, July 1957.

Benjamin Franklyn Gooch, Kansas City, Mo., KVC '07, Mar. 8, 1957.

Ralph F. Graham, Kaw City, Iowa, ISC '04, July 1, 1957.

William David James, Greencastle, Ind., IND '16, June 1, 1957.

M. E. Latham, El Monte, Calif., KCV '10, July 1957.

William J. Lee, Sr., Philadelphia, Pa., UP '09, Aug. 15, 1957.

George W. Musselman, Denver, Ind., MCK '11, Aug. 17, 1957.

John Reichel, UP '06, Aug. 16, 1957.

Lambert T. Rogers, Stamford, Conn., UP '12, Sept. 3, 1956.

Earl W. Sailor, Grand Junction, Iowa, STJ '21, Aug. 12, 1957.

T. M. Tibbet, Rochville, Ind., TH '16, died recently.

William M. Thorning, Hollister, Calif., WSC '41, July 25, 1957.

Edrick K. Tingley, Marietta, Pa., UP '13, July 15, 1957.

James A. Thom, North Bend, Nebr., CVC '05, June 14, 1957.

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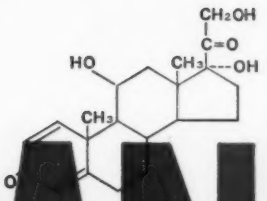

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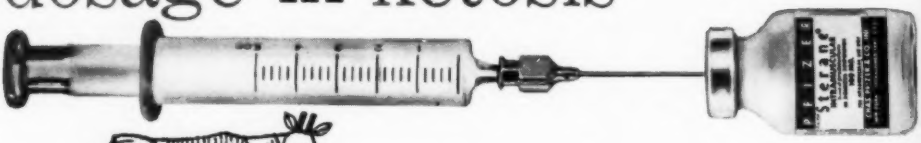

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*Link, R. P.; Newton, D. I., and Huber, W. G.: The Use of Prednisolone in Bovine Ketosis, paper presented at the 93rd Annual Meeting, A.V.M.A., San Antonio, Texas, Oct. 15-18, 1956.

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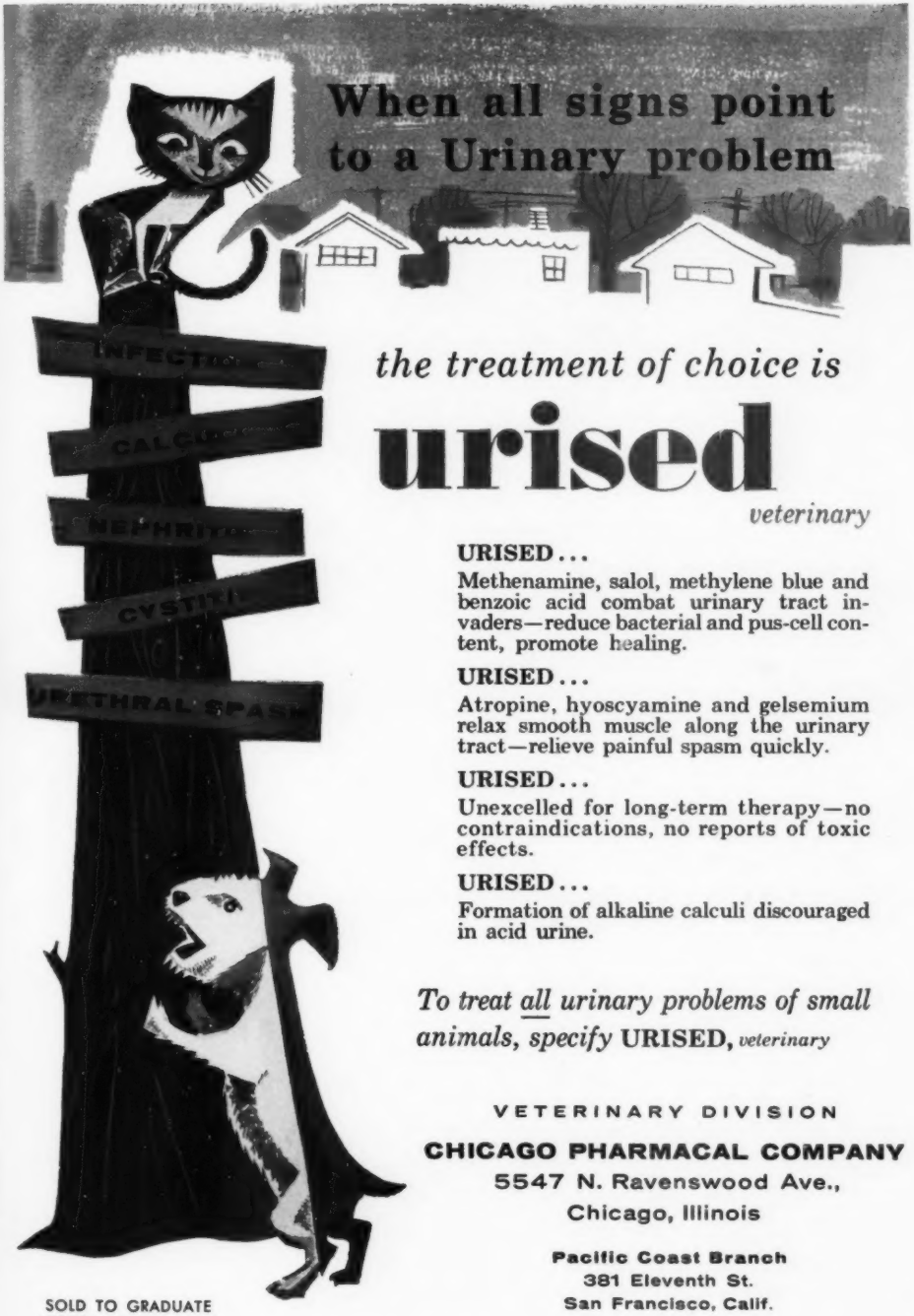

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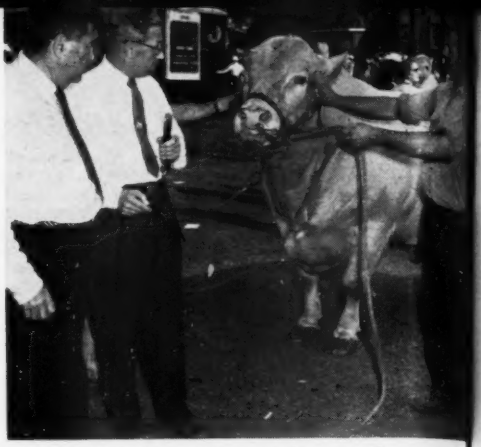

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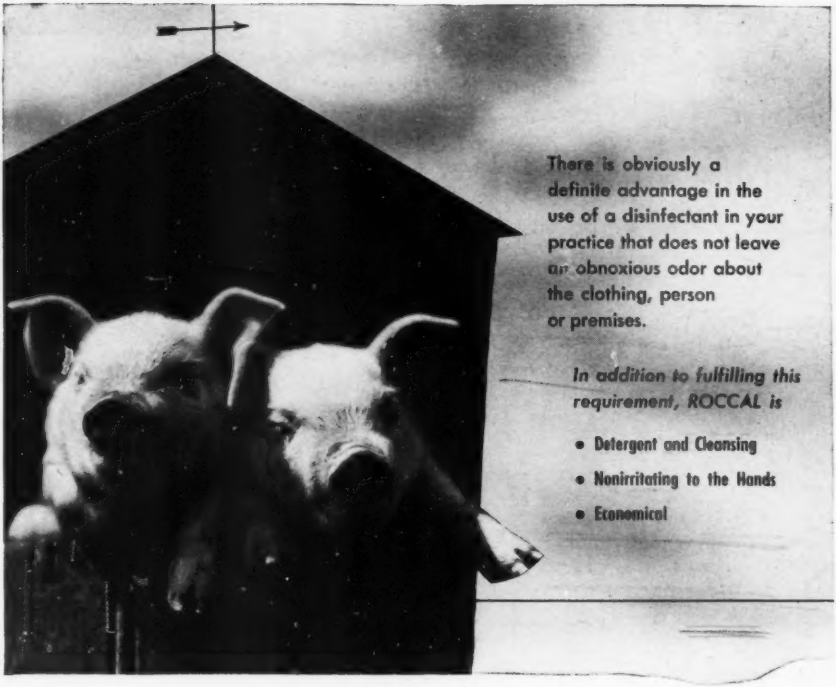

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